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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 39.] 1942. [No. 3.

SUMMARY OF RECENT ABSTRACTS.*

III. MALARIA.

Epidemiology.

WIGGLESWORTH (p. 500) discusses the general application of the principles of malaria investigation and control to war time conditions, especially as they affect troops. The paper cannot be further abstracted but should be read by all those who have the medical care of groups of men in malarious countries.

HACKETT (p. 102) has discussed some of the obscure factors in the epidemiology of malaria which may upset calculations based on measurable factors, and which demand further study. This paper should be read by all those engaged in malaria work.

HUTTON, NAPIER and MANSON-BAHR (p. 333) and GARDNER (p. 557) have all drawn attention to malaria on ships calling at West African ports and in persons landing in England from these ships. The infection is chiefly due to *P. falciparum* and is contracted principally at Freetown. It is emphasized that the disease should be borne in mind and that the use of atebrin as a prophylactic should be pressed.

KEKHCHER (p. 503) shows that in the Province of Moscow malaria parasites are most frequently found in man in June, and are due to relapses or latency. June is the month during which *A. maculipennis* of the first generation emerge, and new cases of malaria cannot occur until mid-July and cannot serve as sources of infection until August, when most of the female mosquitoes have developed fat-bodies and are inactive. The chief sources of infection of mosquitoes are therefore latent cases and relapses.

KINGSBURY (p. 102) records an autumn wave of malaria in the Federated Malay States in 1939, a feature which had not occurred for many years. There is usually a wave from April to June, and in recent years the annual incidence has been relatively high, probably owing to extensive replanting of rubber and the opportunities for anopheline breeding thus created.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1941, Vol. 38. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

ROBERTSON (p. 103) reports that although malaria was apparently not common in Hunan, Central China, until recently, it is now firmly entrenched there, probably as a result of the incursions of refugees and the passage of troops occasioned by the war with Japan. Of the parasites found in a small survey in the north-east, *P. malariae* was the most common : further south *P. falciparum* was most in evidence. He (p. 501) states that on the China-Burma road subtertian malaria is most prevalent in the low-lying plains but that at high altitudes benign tertian is most in evidence. Quartan is rare except in one town. WILLIAMS (p. 502) states that at the eastern end of the China-Burma road malaria is not very prevalent, but at the western end is hyperendemic, especially in the valleys between 2,000 and 5,000 feet. The highest rates were found at Chefang, and here subtertian malaria accounted for 67 per cent. of the cases.

GILL (p. 410) refers to the vital statistics of Ceylon in relation to the incidence of malaria upon natality. On the basis of spleen rates the island can be divided into five zones, and the death rates and infant mortality rates appear to reflect the baneful effects of malaria. Endemic and epidemic malaria have little influence on natality, but increase the frequency of still-births. High degrees of immunity confer partial protection against these accidents of pregnancy.

CAPON (p. 229) records an outbreak in Kahan Tangi, Baluchistan, at an altitude of 6,500 feet above sea level.

GARNHAM (p. 176) remarks that there is a good deal of quartan malaria at Kisumu, Kenya, particularly in children, and that *Anopheles funestus* is an efficient vector of this form. The disease is mild and patients rarely come for treatment, so that most of the cases seen in hospitals are subtertian. HAYNES (p. 227) reports an epidemic of unusual severity in Nairobi, Kenya, during 1940 [it is not clear which was the prevalent type, presumably subtertian].

BRAMBILLA (p. 709) states that malaria is only mildly endemic in Dirre Daua, Abyssinia, and that in one survey 66 per cent. of infections were due to *P. vivax*, the remainder to *P. falciparum*. MOISE (p. 709) records a spleen rate of 41 and a parasite rate of 35 in children of Assab, Eritrea.

AMBIALET (p. 104) reports a severe outbreak of malaria in R'Oufi, Algeria, a region in which transmission was almost non-existent in 1934–36. The observations illustrate the disastrous consequences of intense anophelism even when the local reservoir of malaria infection may appear to be negligibly small.

Malaria causes 2,500 to 4,500 deaths each year in the United States. In Georgia, BROWN (p. 409) points out that subtertian infection is probably more frequent than reports indicate ; most of the deaths occur in children and in adults over middle age. FAUST and PARKER (p. 173) discuss the cyclical incidence of malaria in the southern United States.

PINOTTI (p. 409) states that only one of the 21 States of Brazil, Rio Grande do Sul, appears to be free from malaria. Elsewhere, as a cause of death, malaria is only surpassed by tuberculosis and intestinal diseases.

Aetiology.

ROBERTS (p. 30) describes a malaria parasite which he considers to be a new species, and which had been noted first by D. Bagster WILSON. He names it *P. wilsoni* and points out that it has been found

in refugees from Abyssinia, in natives of Tanganyika and in members of all races in East Africa during a recent epidemic. Clinically the infection is marked by strong tendency to relapse, and by heavy blood infection. The parasite is small and resembles *P. ovale*, the gametocytes are heavily pigmented and the red cells always greatly enlarged, but stippling is frequently absent though a faint quartan type of stippling may be seen. The red cells are usually greatly enlarged. In comment, WENYON points out the necessity for complete investigation of all stages of the life cycle in man and mosquito, and for demonstration that the specific characters are constant after many passages before the decision that this is a valid new species can be made.

RAMAN (p. 290) claims to have found *P. ovale* in a patient infected in India.

STRATMAN-THOMAS (p. 334) has investigated the influence of temperature on *P. vivax* in *A. quadrimaculatus*. The cycle of sporogony was completed in 8 days at 28°–30°C., but took as long as 38 days at 15°–17°C. In mosquitoes maintained at 37·5°C., infection acquired shortly before was abolished within 3 hours, development of oöcysts and infectivity of sporozoites in the salivary glands were aborted or inhibited within 24 hours. On the other hand, in mosquitoes maintained at 1°–10°C., 2½ days were required for elimination of infection recently acquired, and 24 days for interruption of oöcyst development. It is therefore evident that although development of the parasite in the mosquito is more rapid in moderate warmth than in moderate cold, the parasite is more susceptible to greater heat than to greater cold. It was also found that adult *A. quadrimaculatus* can survive higher and lower temperatures than the forms of *P. vivax* it harbours.

FIELD and LE FLEMING (p. 501) have described the morphology of *P. malariae* in thick films and FIELD (p. 501) discusses the differential diagnosis of the three common species.

Transmission.

Although *A. maculipennis* var. *atroparvus* from English sources can readily be infected with *P. vivax* and *P. ovale* and with *P. falciparum* from Italy and Rumania, SHUTE (p. 176) reports that he failed to infect it with strains of *P. falciparum* from Indian and African sources. He concludes that there is little chance of spread of subtertian fever of tropical origin from gametocyte carriers in Great Britain.

BATES (p. 558) discusses the nomenclature of members of the *A. maculipennis* group. He recognizes 7 types of eggs, and states that it is often possible to distinguish between the larvae of the different races. He regards the differences between some of the races as of specific value, and gives a proposed classification of the group, with information on geographical distribution. He (p. 502) gives details of his method of rearing *A. maculipennis*, with particular reference to combinations of salts used in the water. As a routine he uses water containing grass sods, but in comment SHUTE points out that if the water is gently aerated for an hour or so each day the changing of water advocated by Bates is not necessary. Shute also states that sods should be collected some distance away from tarred roads and fences, and that the addition of organic foods to pans containing large sods is unnecessary.

In Sardinia PAMPANA and CASINI (p. 710) state that of the anophelines found, *A. claviger*, *A. algeriensis* and *A. maculipennis labranchiae*, the

last is the vector. Hibernating females of this species begin to leave their winter quarters at the end of February, the first generation hatching in April. Mean temperatures below 15°C. and above 25°C. appear to be unfavourable to this insect. The first annual wave of subtertian fever, which occurs in June, is due to new infections and not to relapses. There are enough crescent carriers in the pre-epidemic season to account for this.

FARID (p. 710) has found *A. sergenti* in the Nile valley, with a sporozoite rate of 2·7 per cent. This mosquito has not previously been reported from that area, where *A. pharoensis* was generally regarded as the principal vector. Actually, *A. pharoensis* was not common in the district investigated, and was not found to be infected.

The only important vector in Nairobi, Kenya, is *A. gambiae*, and SYMES (p. 559) shows that during the drier months larvae are to be found in relatively few permanent breeding places, but that in the rains great numbers are present in almost every pool, pit and puddle. Most of these breeding places are man-made. Ideal breeding facilities are provided by the irrigation channels of the "swamp" used for market gardening. In Kisumu, Kenya, GARNHAM (p. 176) reports that the type form of *A. funestus* has a seasonal prevalence much less connected with rainfall than has *A. gambiae*, and that the maximum prevalence takes place some 3 months after the maximum rainfall, when the malaria incidence is declining. Nevertheless, *A. funestus* is second only to *A. gambiae* as a vector, and shows greater anthropophilic tendencies; the sporozoite rate is higher in the dry season than in the rains. In Dirre Daua, Abyssinia, BRAMBILLA (p. 709) reports that *A. gambiae* can be found at all seasons of the year in small numbers in native huts.

SHANNON and DE ANDRADE (p. 229) show that in Brazil *A. gambiae* prefers small bodies of water exposed to the sun, and sand-lined rather than mud-lined pools. It avoids water containing vegetation. In the dry season most of the breeding places are man-made, shallow wells or irrigation ditches.

THOMSON (p. 335) has made a close study of *A. minimus* in Assam. The female oviposits at night in shaded running water, usually along grassy banks, yet heavy shading will eliminate breeding. This anomaly is explained by the secondary results of heavy shading, which eliminates vegetation from the water margins and causes, therefore, increase in the rate of flow. Rate of flow is important because the female prefers to deposit eggs in comparatively still water such as is found along grassy edges or in side pockets, even if these have no vegetation, and because, contrary to popular belief, the larva is ill-adapted to resist being carried away by flowing water. The larva is normally maintained in still water, not by avoidance of moving water, but by powerful attraction to shade, and even if the shaded portion is fast-flowing, yet the larva will still seek the shade. Control by shading is therefore due to elimination of small vegetation and consequent increase of water movement, and the same result can be obtained by exposing the stream to light and eliminating all vegetation; it depends on local circumstances which is the better plan to adopt. Larvae of *A. minimus* are killed in 5 minutes at a temperature of 41°C., which is often exceeded in shallow rice fields even when rice shoots, 9 inches apart, are 2 feet high. Larvae of *A. hyrcanus*, *A. barbirostris* and *A. vagus* can survive higher temperatures. Maximum temperatures in the running water breeding places of *A. minimus*

rarely exceeded 35°C., but it is not clear why female *A. minimus*, ovipositing at night, when rice field water is cool, avoids such water.

COVELL (p. 228) states that in the U. P. Terai the chief vector is *A. minimus* which in Bazpur, at the height of the malaria season, showed a rate of infectivity of 18 per cent. With regard to *A. fluviatilis*, in the U. P. Terai only 1·4 per cent. contained human blood, whereas the proportion in the Wynaad, S. India, was 96·9 per cent. in one investigation. There are no morphological differences between these mosquitoes from the two places, but it is clear that they belong to two quite different biological races.

The important vectors in Bengal are stated by IYENGAR (p. 228) to be :—In the plains *A. philippinensis*, in the submontane area *A. minimus*, in the deltaic area *A. sundaicus*, but infection was also found in *A. annularis* and *A. varuna*. Total infection rates found were :—*A. philippinensis* 6·3, *A. minimus* 18·6, and *A. sundaicus* 15·8 per cent. The investigation covered 14 localities, and over 11,000 Anopheles were caught in dwellings. SEN (p. 711) gives more detail concerning the mosquitoes of Bengal. In the submontane region *A. minimus* breeds in streams, terraced rice plots and drains, and malaria is intense. In the upper delta *A. philippinensis* breeds in tanks, ponds, silted river beds and marshes, and in some districts malaria is severe. In the lower delta *A. philippinensis* is responsible for some malaria but transmission is chiefly by *A. sundaicus*, breeding in fish ponds or rice fields from which sea water has been excluded. In the estuarine area *A. sundaicus* breeds where mangrove swamps have been cleared, and is responsible for the increased malaria there. *A. culicifacies* is widespread but appears to be of no importance as a carrier.

WHITE and NARAYANA (p. 561) confirm previous findings that the only vectors in the Singhbhum Hills belong to the *funestus* group—*A. fluviatilis*, *A. minimus* and *A. varuna*. Since 1938, anti-larval measures have been restricted to this group and it now appears, from the results of catches made with trap nets in the controlled area, that control of *A. varuna* is complete, that *A. minimus* has been reduced by more than 90 per cent., but that almost one-third of *A. fluviatilis* remains uncontrolled.

AFRIDI *et al.* (p. 105) have reviewed the literature on the behaviour of adult *A. culicifacies* and report their own observations, which should be sought in the original by those interested. WHITE (p. 504) sets out the results of dissections of a large number of *A. culicifacies* made in various parts of India. Sporozoite rates were :—Trans-Indus 2·3 per cent., Indus-Upper Ganges 0·4, N. Gangetic plain 0·06, and S. Gangetic plain *nil*. The mosquito is therefore not an efficient vector in the Gangetic plain, but no satisfactory explanation is forthcoming. Eggs provide no evidence of separate races, and careful anatomical studies of all stages are called for.

Although *A. culicifacies* is the dominant species in the eastern Satpura ranges of the Central Provinces, WHITE and ADHIKARI (p. 560) show that infected specimens were found in two only of the 13 localities studied, and that the sporozoite rates were very low. It probably plays a very minor part in transmission. In the hyperendemic areas *A. fluviatilis* and *A. varuna* are the chief vectors.

RUSSELL and RAO (p. 559) have found ten species of Anopheles breeding in rice fields in the Tanjore district. Of these *A. culicifacies* is the only vector of any importance, and it is most prevalent in wet

fields before ploughing. When the rice attains a height of 12 inches above the water surface the breeding of *A. culicifacies* is checked, but *A. hyrcanus* becomes more plentiful. It seems, therefore, that the distribution and density of species depends more upon the stage of the rice than upon season. In the Pattukkottai Taluk, Tanjore District, S. India, RUSSELL and RAO (p. 642) have found that, with the exception of a few isolated infections in *A. subpictus* and *A. vagus*, the only infected anopheline was *A. culicifacies*, with a sporozoite index of 0·061 per cent. This rate is low, but is apparently enough to account for average spleen and parasite rates of 40 and 30 per cent. respectively.

WHITE (p. 505) states that neither *A. stephensi* nor the *mysorensis* form have been found to be infected in Calcutta [it will be remembered that *A. stephensi* is an important vector in Bombay and elsewhere].

RUSSELL and RAO (p. 228) record their observations on the association of larvae of Anopheles species in south-eastern Madras.

In the province of Hunan, Central China, ROBERTSON (p. 103) found *A. hyrcanus* var. *sinensis* to be the most prevalent anopheline and the most important vector of malaria, but in the south-western part of the province *A. minimus* and *A. maculatus* were found in the hilly regions, and *A. minimus* is there important in the spread of the disease. On the China-Burma road, however, he (p. 501) reports that although *A. hyrcanus* var. *sinensis* is the most prevalent species, and is occasionally infected, it is not an important vector. *A. minimus* is responsible for most of the transmission, and where it is abundant, subtertian malaria is prevalent. A similar opinion is expressed by WILLIAMS (p. 502).

HU (p. 176) shows that in Shanghai *A. hyrcanus* var. *sinensis* has a considerable predilection for bedrooms ; screening these may therefore be an effective antimalaria measure. Although *A. hyrcanus* var. *sinensis* is the most important vector near Shanghai, the same author (p. 105) reports that it is found in very much greater numbers in cowsheds, pigsties and goat stables than in adjacent human habitations.

BAISAS (p. 174) reports an outbreak of malaria in Lahuy island, Philippines, which was reputed to be free from the disease until labourers were imported. *A. flavirostris* and *A. maculatus* were found breeding there.

KOMP (p. 106) reports the finding of larvae of *A. darlingi* in pools alongside a creek in British Honduras, and of adults in Guatemala. The range of this vector is therefore far north of the previously known limit in Venezuela and British Guiana.

BOYD and JOBBINS (p. 106) show that a strain of *A. albimanus* from Panama was less susceptible to infection with strains of *P. falciparum* from Mexico and Florida than was a strain of *A. quadrimaculatus* from Florida, but that both were equally susceptible to a strain of *P. falciparum* from Panama.

PINOTTI (p. 409) states that in part of the coastal area of the State of Rio de Janeiro the principal vector is *A. albitarsis*, though *A. darlingi*, *A. argyritarsis* and *A. tarsimaculatus* also transmit malaria.

THOROUGHMAN (p. 505) reports that in the Soochow hospital, in China, the transmission of malaria by blood transfusion is common in spite of the fact that the blood of donors is examined for parasites before transfusion is undertaken, and that if parasites are found that donor is not used. It is, of course, realized that a negative blood smear does not exclude infection, and that latent infection in the recipients cannot be ruled out, but it is probable that some at least of the patients

are infected from the donor blood. [No mention is made as to whether the transfusions are made direct, or the blood stored before use.] The attacks are readily controlled by quinine, and no attacks were produced in patients who for 3 days after transfusion were given prophylactic quinine.

MOST (p. 174) reports on malaria in drug addicts in New York, in whom infection is acquired from the indiscriminate use of unsterilized syringes for intravenous injection. Most of the infections were with *P. falciparum* and many deaths occurred in the series of 200 cases investigated. The majority of the fatalities were due to cerebral infection. MOST and JOLLIFFE (p. 175) give details of the treatment adopted in cases of malaria in drug addicts. Quinine is given intravenously if the nervous system is involved, with large quantities of glucose saline, to which is added 10 mgm. thiamin chloride, parenterally. Blood transfusion may be used in certain circumstances, and cerebrospinal fluid may be withdrawn. When acute symptoms subside, atebrin is given and plasmoquine may be needed if gametocytes are present. By these means the death rate in severe cases has been greatly reduced. CHUNG *et al.* (p. 106) record 22 cases of subtertian malaria in drug addicts in Peiping. The disease is transmitted in the process of intravenous injection of morphine or heroin, since in the drug dens no attempt is made to sterilize the syringes used, and blood from each recipient is drawn into the syringe at each injection. Clinically, the infections were severe.

Pathology.

In a consideration of the pathology of malarial coma, OGURTSOVA (p. 642) suggests that the condition is due to heavy invasion of the cerebral capillaries by the parasites, accompanied by a general or local depression of the reticulo-endothelial system. Haemorrhages and necrotic lesions are absent from the cerebral cortex, where circulatory compensation is rich, but this great capillary network offers a wide field for the toxic activity of the parasites, which results in diffuse affection of the grey matter and the grave symptoms observed in malarial coma. Cardiac weakness, which is a marked feature, is due to blockage of the vascular system, with stasis and haemorrhages and a consequent reduction of blood pressure. MALKIEL (p. 643) states that the pathological process in malarial coma represents meningo-encephalitis with granulomata resembling those found in infectious encephalitis. These are localized chiefly in the white matter of the cerebral hemispheres, in the corpus striatum, internal capsule, nucleus dentatus of the cerebellum, and sometimes in the subependymal region, but not in the cerebral or cerebellar cortex or the cerebellar white matter.

Clinical Findings.

SANFORD *et al.* (p. 337) report on 48 cases of malarial coma, in 3 of which *P. vivax* only was found in the blood. In comment, WHITE points out that the failure to find *P. falciparum* in blood smears does not preclude the possibility of *P. falciparum* infection. BHATTACHARJEE (p. 644) reports a case of cerebral malaria in which the patient was afebrile but had a series of epileptiform attacks a few hours before death. SARKAR (p. 644) reports a patient with malaria who was, during the attack, completely mentally deranged. He recovered quickly under treatment with quinine. NARAYAN (p. 712) records a case

of cerebral malaria, simulating meningitis, which was refractory to quinine, but in which atebrin effected cure.

DANIEL (p. 177) reports 9 cases in which malaria simulated acute abdominal disease. In 7 the infection was due to *P. vivax*, in 2 to *P. falciparum*. There was usually acute abdominal pain, and in some cases rigidity, but high fever was not a prominent symptom. The existence of leucopenia was suggestive in diagnosis. All these patients recovered in response to malaria therapy, but the author quotes another case in which tertian malaria was complicated by localized peritonitis arising from a perforated duodenal ulcer.

HEISCH (p. 230) states that in Nairobi many of the patients with dysenteric symptoms associated with malaria are cured of their dysentery by quinine.

LIEM TJAIJ TIE (p. 711) reports 7 cases of congenital malaria in the Netherlands East Indies, and PIK GING HOO (p. 711) one in an infant born in Amsterdam. He discusses the possible mechanism of transplacental infection.

Since the red blood cells contain twenty times as much potassium as the plasma, ZWEMER *et al.* (p. 336) have considered the possibility that the release of potassium from the cells at the time of rupture of the merozoites may be the cause of the paroxysms of fever in malaria. They found a marked increase in plasma potassium, which is accompanied by chills and precedes the rise in temperature. The base line potassium values tend to increase with progress of the infection.

MER *et al.* (p. 562) have investigated the laking power of bile on blood from normal persons and from those suffering from malaria. The red cells of malarious patients were laked in rather shorter time than the normal, and the taking of quinine or plasmoquine appeared to increase the sensitivity of the cells in malaria.

MOST and TEWKSBURY (p. 644) give details of the laboratory findings in the malaria of drug addicts. Macrocytic anaemia was common, bilirubin in the blood was often increased, serum albumin reduced and globulin frequently increased.

BOYD (p. 411) reports a study of therapeutic quartan malaria. In 5 cases the infection was naturally induced ; in these the incubation period was 4 to 5 weeks, but parasites were found in the blood 3 to 12 days before the clinical onset. In 43 cases trophozoites were inoculated intravenously ; in these the average incubation period was 19·2 days, but parasites could often be found 10 days earlier. The mean duration of naturally induced disease was 132 days, of artificially induced disease 92 days. In general, parasite densities were low, but in one case 114,000 per cmm. were found, and the patient died in spite of quinine, apparently as a result of the malaria. ARMENTANO and BENTSÁTH (p. 506) describe a case of quartan malaria in which the parasites could not be found in the blood though they were present in fairly large numbers in the sternal marrow. Pigmented and non-pigmented forms were seen. In a second case, pigmented and non-pigmented forms of *P. vivax* were found in the marrow, but not in the blood. The authors discuss the question of exo-erythrocytic forms of parasites. BOYD and PROSKE (p. 563) found that in two patients with quartan malaria and oedema there was a definite association between the albuminuria which occurred, the depression in plasma albumin, and the oedema. This combination suggests nephrosis rather than nephritis. In benign and subtertian infections these three factors were not closely associated.

YOUNG *et al.* (p. 334) have shown that the segmentation time of *P. malariae* is undoubtedly affected by changes in the sleeping time of the host, but not by light or darkness.

From a study of patients repatriated from E. Africa CASTELLI (p. 708) concludes that febrile relapses of malaria are rare after 15 months from the date of infection, and exceptional after 2 years. Relapses due to *P. vivax* were ten times as frequent as those due to *P. falciparum* though the latter infection was the more common.

VENHUIS (p. 563) reports that the flagellate *Bodo caudatus*, present in distilled water used for the dilution of Giemsa stain, was mistaken for the malaria parasite, and that this mistake led to the report of an outbreak of malaria which did not exist. The use of freshly distilled water should prevent this error.

CASTRO (p. 230) describes a rapid method of staining thick blood-films, which cannot be further abstracted.

STRATMAN-THOMAS and DULANEY (p. 336) have failed to obtain any skin reaction which could be regarded as specific for malaria, although several forms of antigen were used. Similarly, they could not obtain any specific precipitin reaction. With the complement fixation reaction, on the other hand, highly specific results are obtained in malaria with antigens prepared from either human or monkey parasitized blood. Details of the preparation of these antigens are given. These authors later (pp. 411, 412) describe the production of antigens from *P. knowlesi*, *P. vivax* or *P. malariae*, which give strong complement fixation reactions with sera from malarious patients. These are therefore group reactions and are not modified by syphilis. Complement fixation reactions are closely correlated with the presence of parasites in the blood, but a negative reaction cannot be taken as a certain indication of absence of parasites. In diagnosis the reaction might be valuable in subtertian malaria where parasites, though present in the body, are absent from the peripheral blood. These antigens are not useful for skin or precipitin reactions.

WOLFF (p. 291) describes a simplified technique for his buffer precipitin test for the diagnosis of chronic malaria. Blood should be taken in the morning before breakfast and not in the feverish stage.

ASAI (p. 507) records the results of the Henry reaction in which artificial melanin gave, on the whole, better results than natural melanin.

OU (p. 507) has investigated the Takata reaction in malaria; it is more often positive in chronic than in acute cases.

Charles Wilcocks.

[*To be continued.*]

FEVERS OF THE TYPHUS GROUP AND OTHER FEVERS.

BUCHWALD (Hildegard). Untersuchungen ueber Normalagglutinine gegen Proteus-X-Stämme. [**Agglutinins of the** *Proteus X* **Group in Normal Sera.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1941. May 12. Vol. 99. No. 6. pp. 409–418.

Tests were made of the sera of 300 persons who were known to be free from any suspicion of having had typhus fever. Live cultures of

selected strains were used and the final readings were made after 14 hours incubation at 37°C.

The responses were classified as follows :—

(1) Macroscopic flocculation, in clear liquid=++
(2) ,, ,, in turbid liquid=+
(3) Flocculation visible only with agglutinoscope=±

The results were :—

1–25	1–50	1–100	1–200	*OX19*	*OX2*	*OXK*
—	—	—	—	110	97	193
±	—	—	—	89	101	73
±	±	—	—	73	72	32
±	±	±	—	16	4	2
+	±	—	—	11	22	0
+	±	±	—	0	3	0
+	+	±	—	0	1	0
++	+	±	—	1	0	0

Only two sera gave a definitely positive reaction in dilutions of 1–50, one of these to *Proteus QX19* and one to *OX2*.

Of the persons from whom the sera were taken 180 were pregnant women, 30 gave positive reactions to tests for syphilis, 10 had accelerated sedimentation rates of the red corpuscles and 5 had trachoma, but none of these conditions made any appreciable difference to the responses.

[A point that still remains to be cleared up is whether sera which give positive reactions in dilutions of 1–25 would show a rising titre during attacks of typhoid or other non-Rickettsial fevers. Till this matter has been investigated some doubts will remain as to what constitutes a significant reaction.] *John W. D. Megaw.*

McCormack (J. D.). [**Typhus Fever in the Town of Drogheda.**]—*Report Dept. of Local Govt. & Public Health, Eire, 1939–1940.* Appendix XIII. pp. 136–137.

In this report an account is given of an outbreak of typhus in Drogheda in which there were 5 cases with 3 deaths. The origin is ascribed to "some old articles which had been stored away in a trunk for many years, and had lain undisturbed until they were acquired by the family who were [or, presumably, subsequently became] chiefly affected by the typhus. The house where this trunk had come from had passed through at least two devastating epidemics of typhus fever." [There would seem to be ground for the opinion that this infection may have been contracted by inhalation of infected material from the contents of the trunk. Lice cannot live long away from man, but it is known that Rickettsiae in dried louse faeces may remain alive for a year or more.] *C. W.*

ROMERO ESCACENA (G.). Estudio clínico y experimental del tifus exantemático.—Epidemia de Sevilla. (Primera communicación.) [**An Outbreak of Epidemic Typhus Fever in Seville.**]—*Rev. Clin. Española.* 1941. Apr. 1. Vol. 2. No. 4. pp. 349–357. With 7 figs. [32 refs.] German summary.

This paper gives a full and graphic account of an outbreak of louse-borne typhus fever which appeared in the spring of 1940 and disappeared suddenly with the establishment of summer weather conditions.

All the patients, 93 in number, were louse-infested, most of them came from a hostel for beggars where the inmates were living in deplorable conditions. There were several minor foci of infection in places visited by the beggars in the course of their wanderings.

The age distribution was as follows :—29 patients were under 10 years of age ; 15 were between 10 and 20 ; 27 between 20 and 40 ; and 22 were over 40.

The total case mortality rate was 18 per cent. ; it was *nil* in patients under 20 years of age, about 9 per cent. between the ages of 20 and 40, it then rose steeply, reaching 100 per cent. in persons over 55.

Some of the chief clinical features were as follows :—

In 94 per cent. of the cases the onset was sudden with intense headache, giddiness, nausea, sometimes also vomiting, chills and generalized body pains. In young children the onset and course of the fever were often irregular and the attacks very mild. Restlessness and insomnia were pronounced for the first two to four days, afterwards there was stupor or coma.

The rash usually appeared on the 3rd to the 7th day, but in a few cases it was not detected till the 9th day : it was often obscured in the early stages by pigmentation of the skin and the presence of other lesions. The rash was always petechial, never papular ; it often appeared earlier and was more pronounced over the deltoids than in other regions. In one case it was clearly seen on the palms and soles ; one child had a few petechiae on the face. In three of the fatal cases the rash was purpuric.

The author calls special attention to pronounced tenderness of the slightly enlarged spleen in the early stages ; he observed this condition in every case and regarded it as a feature of great diagnostic importance.

The leucocyte count exceeded 8,000 in 94·4 per cent. of the cases ; in about 47 per cent. it ranged from 20,000 to 31,000. All but one of the fatal cases had counts of more than 18,000.

The usual agglutination response to *Proteus X19* occurred in most of the cases ; the reaction frequently remained negative till about the 8th day, but in one patient it did not become positive till the 19th day. In 6 per cent. it remained negative during the whole period of observation.

There were several positive Widal reactions to *Bact. typhosum*, in one case up to a titre of 1–500. These reactions were probably due to previous attacks of typhoid fever, and two of the patients who reacted were known to have been treated recently for this disease.

Prophylactic vaccination with live murine virus prepared by a modification of Laigret's method was tried ; the results were not conclusive, but the vaccine was quite innocuous.

The author discusses the possibility that the infection was of the murine type, but there were good reasons for rejecting this hypothesis.

In the discussion it is stated that a diagnosis of murine typhus is never justified unless all the following conditions are fulfilled: (1) The first case must have been observed; (2) louse infestation must have been excluded; (3) there must have been no possible contact with an infected person; and (4) murine virus must have been isolated from rats found on the premises occupied by the patient.

Convalescent serum did not appear to benefit the three patients to whom it was given. Various special remedies were tried, but all were found ineffective. Cardiovascular tonics were regarded as "fundamental" in the treatment of the disease. *J. W. D. M.*

ROCKEFELLER FOUNDATION. REPORT OF THE HEALTH COMMISSION JUNE 27, 1940 TO JUNE 30, 1941. pp. 76–82.—**Typhus Fever.** [Summary appears also in *Bulletin of Hygiene.*]

This is an account of the work done by members of the staff of the International Health Division in Spain. Typhus was reported in March 1941 in small towns in S.E. Spain, and 90 cases were recorded. At that time there occurred 54 cases in Madrid and further cases were reported until May. About 20,000 persons were vaccinated with the Cox yolk sac vaccine; 5 cases of typhus were reported in laboratory workers who had received this vaccine and after a period thought enough for immunity to have developed, but the infections were mild. The Cox vaccine protects guineapigs against 1,000 doses of virulent guineapig material, and has made a good impression on health officials in Madrid.

In Malaga an epidemic of typhus began early in March 1941 and by the middle of July 2,000 cases had been reported; it is believed that at least 4,000 actually occurred. This high summer incidence was regarded as a warning that an extensive epidemic might occur in the winter of 1941–42, and that the disease might spread north and east in Europe from the focus in Spain.

[It is worthy of note that in the *Public Health Reports*, Washington, 1941, Nov. 28, Vol. 56, p. 2319, there is a record of typhus as follows:—Spain, Jan–Aug., 1941, 8,906 cases, Sept., 172 cases, Oct. (first 3 weeks), 71 cases. Germany, Jan.–Aug., 1941, 1,531 cases, Sept., 147 cases, Oct. (first 3 weeks), 49 cases. In the same publication (Nov. 14, 1941) at p. 2231 a table gives in detail the number of cases reported from the various Provinces of Spain during the first 8 months of 1941.]

C. W.

GROOT (Hernando), MAYORAL (Pedro) & MARTÍNEZ (Luis E.). Tifo exantematico en Nariño. [**Typhus Fever in Nariño.**]—*Rev. Facul. de Med.* Bogota. 1941. May. Vol. 9. No. 11. pp. 770–778. With 1 chart & 1 map.

[Nariño is a department of Colombia near the equator]. Twenty-two cases of typhus were observed in one year among poverty-stricken and louse-infested persons living in widely separated localities at altitudes ranging from 4,000 to 8,000 feet. The attacks occurred in isolated cases or in small family outbreaks. Many other cases must have occurred.

The serum reactions were positive to *Proteus X19* in titres of 1–60 to 1–5,040; only in six cases was the titre less than 1–300.

Negative responses were found to *Proteus X2* and *OXK*, and to organisms of the typhoid, paratyphoid and undulant fever groups.

Guineapigs inoculated with the blood of patients had a febrile reaction lasting about six or seven days. The Mooser reaction was feeble or negative. None of the animals died. Rickettsiae were found in the tunica vaginalis of some of the animals.

The authors state that the investigation of the virus is at too early a stage to justify any dogmatic assertions about its characteristics, but they point out that conditions are favourable to its spread by lice. [Compare the micro-epidemics of the Peruvian highlands, this *Bulletin*, 1940, Vol. 37, p. 564.] *J. W. D. M.*

GROMASHEWSKIJ (L. W.). Die Ergebnisse der experimentellen Methode beim Studium einiger Fragen der Epidemiologie des Fleckfiebers. [**An Experimental Study of Some Aspects of the Epidemiology of Typhus Fever.**]—*Acta Med. URSS.* Moscow. 1940. Vol. 3. No. 3. pp. 290–300. With 4 figs.

Much of this paper consists of a sharp criticism of the readiness with which so many workers have accepted the hypothesis of inapparent infections and healthy virus carriers of typhus fever. Special objection is taken to evidence based on slight or moderately positive Weil-Felix responses [see above, BUCHWALD] and on febrile reactions in experimental guineapigs. The author gives a number of examples of false positives which he has encountered in his animal experiments. He refers to the numerous investigations in which there has been a complete failure to isolate the virus from the blood of convalescents more than two, or at most three, days after the end of the fever.

He himself tested the blood of 25 patients : in 15 cases the blood was taken 4 to 6 days before the fall of the temperature and 13 were positive : in 10 cases examined up to 3 days before the end of the fever there were only 3 positives. Of 16 cases examined on the first day of convalescence three were positive, but all the 9 cases examined 2 to 3 days after the fall of the temperature were negative.

He next tested " about " 30 persons who were known to have had the disease at varying intervals beforehand : no virus was found in any of them.

He then selected " about " 30 persons who were known to be living in conditions of great risk of infection, and, in fact, three of them had subsequent attacks of typhus—2, 5, and 22 days respectively, after the blood was taken—virus was found only in the case in which the disease appeared two days later.

From these experiments and from a critical study of the published records the author concludes that there is no evidence of the existence of healthy carriers of the virus, or of inapparent infections.

J. W. D. M.

VEINTEMILLAS (Félix). El antigeno a Proteus " X-19 " como rapido medio de diagnostico del tifus altiplanico. [**A Rapid Method of diagnosing Altiplanic Typhus (Epidemic Typhus) by** *Proteus X19.*] —*Suplemento d. Inst. Nac. Bact.* La Paz, Bolivia. 1941. June. pp. 40–44. With 1 fig.

The method is a modification of the test described by CASTAÑEDA and his colleagues ; this in turn is a modification of the technique originated by WELCH in 1936.

A drop of the patient's serum is placed on a clean glass slide and mixed with a drop of a blue-tinted suspension of *Proteus X19* or other bacillus of the Proteus group. When the reaction is positive, blue clumps appear within one or two minutes: the clumps are easily seen with the naked eye. The reaction is regarded as negative when the mixture remains homogeneous or shows only very fine granules.

A drop of blood can be used instead of serum, but sometimes there is haemolysis which causes a reddish tint in the mixture; sometimes also there is clumping of the red cells and the formation of a brick-red deposit.

The suspension of bacteria is made from 24-hour gelatine cultures made on Petri dishes: the colonies are used to make a concentrated mixture in normal saline to which 10 per cent. formalin has been added; after 24 hours this is filtered through gauze and mixed with a 1·1 per cent. solution of citrate of soda so as to make a milky emulsion. A few drops of 1·0 per cent. methylene blue are added to give the blue colour.

By mixing a number of different strains of *Proteus X19* a polyvalent test suspension can be made; suspensions of *Proteus OXK* and *OX2* can also be used in the same way.

The test proved quite satisfactory in a considerable number of hospital cases and is strongly recommended for the use of private practitioners. [See also this *Bulletin*, 1941, Vol. 38, p. 448. In the present work the strains used are referred to as *Proteus X19* Arg., *OX19, X19LP*. Presumably the *O* variants were used in each case.]

J. W. D. M.

MUNK (Fritz). Ueber die zerebralen Krankheitserscheinungen beim Fleckfieber. [**Cerebral Symptoms in Typhus.**]—*Arquivos do Inst. Biol.* Buenos Aires. 1940. Vol. 11. pp. 309–316.

ROSSIYSKY (D. M.). [**Disinfection and Prophylactic Measures in Typhus and Relapsing Fever.**]—*Soviet Med.* 1940. No. 3.

The author writes of two preparations useful in the control of lice. The first, "Nassecamoyad" is "a 10 per cent. solution of kerosene-carbolic soap." The second, "Solvent," a product of benzole and toluol derived by fractional distillation and retaining their highest homologues. The former does not irritate the skin, destroys lice quickly but its protective action lasts only 2 to 4 days. The fumes of "Solvent" destroy lice in 9 to 12 minutes; the substance is stated to cause no harm to human tissues.

Three other preparations are mentioned but full details of their composition are not given. On the whole, the two named above are regarded as the best, but it is pointed out that in the control of lice, personal hygiene and cleanliness are essential. *C. W.*

CHASOVNIKOV (A. A.). [**Examples in combating Local Foci of Typhus Exanthematicus in Rural Conditions.**]—*Soviet Med.* 1940. No. 9.

The author states that cholera, relapsing fever and smallpox have disappeared from the territory of the Soviet Union, and that in the Ukraine typhus has declined in recent years. There remain foci of typhus, and that at Kremenchug, where there was an epidemic outbreak

in 1938–1939, is considered. It is pointed out that the spread of the disease was largely due to mistaken diagnosis, delay in transfer of patients to hospital and unsatisfactory decontamination. Other authors have reported cases of typhus in which no rash was seen [see this *Bulletin*, 1941, Vol. 38, p. 440], but the present author states that no case of his has been confirmed in the absence of this cardinal sign. In all cases there was a typical temperature with crisis or lysis on the 13th to 15th day.

The method of combating an outbreak is as follows. A group of medical workers under an epidemiologist is sent to the region concerned, patients are sent to hospital, and disinfestation is commenced. This consists of disinfection of the room [presumably that occupied by the patient], cutting of the hair, or washing in "Solvent" solution [presumably of contacts], bathing of all members of the family and "Solventization" of the bed. [There is, curiously, no mention of disinfection of garments, and no reference to heat treatment.] Visits to the homes of neighbours are made and often result in the discovery of cases or of convalescents. Contacts are observed daily for at least 30 days, temperatures are taken and persons showing a rise are sent to hospital.

Mass disinfestation of school-children is carried out and is combined with visits to the homes of the children, so that any homes in which lice are found can be dealt with. Children absent from school are visited on the first day of absence so that early diagnosis may be made. Instruction of the people is carried out with the help of the local Soviet and of the administration of the collective farms. *C. W.*

Liu (Wei-T'ung) & Zia (Samuel H.). **Studies on the Murine Origin of Typhus Epidemics in North China. I. Murine Typhus Rickettsia isolated from Body Lice in the Garments of a Sporadic Case.**—*Amer. Jl. Trop. Med.* 1941. July. Vol. 21. No. 4. pp. 507–523. With 2 figs. [51 refs.]

This paper deals with the important problem of the relationship between the human and murine Rickettsiae.

A louse-infested inhabitant of Peiping who had been living in an inn infested with rats, mice and fleas had a moderately severe attack of typhus fever with a pronounced Weil-Felix reaction. There was no evidence of contact with an infected person; the clinical and epidemiological evidence pointed equally to louse-borne and flea-borne infection.

Altogether 54 lice were recovered from the patient's clothing. Smears made from four of these showed no Rickettsiae. Each of two guineapigs was inoculated intraperitoneally with the crushed bodies of 25 of the lice, and two other guineapigs were given 5 cc. each of the patient's blood by the same route. All the animals reacted with fever in 6 to 7 days but there was no scrotal swelling. Emulsions of the brain or brain and tunica in doses of $\frac{1}{4}$ to $\frac{1}{2}$ of the total emulsion were inoculated into other guineapigs and the virus of blood and louse origin was passed through guineapigs for 13 and 14 generations respectively. Rickettsiae were often recovered, inapparent infections were rather frequent, the duration of the fever was relatively short, nodular lesions were either scanty or absent in the brains, there was some degree of congestion and infiltration of the tunica vaginalis, but the typical Neill-Mooser reaction was "conspicuously absent."

Virus of both strains originating from infected guineapigs was passaged 15 times through albino rats and 5 times through mice. Of 50 guineapigs inoculated, 3 died ; of 60 rats, 6 died ; but of 87 mice, 28 died before the 10th day.

From their own previous observations and others recorded in the literature the authors conclude that they were dealing with murine Rickettsiae despite their failure to produce the typical Neill-Mooser reaction in guineapigs. They go on to state : "It was concluded that, in North China, as in Mexico, when louse-infested persons contract murine typhus, the body louse may become a carrier of the murine Rickettsiae, and, in all probability, may give rise to small or large epidemics under favourable circumstances." [See this *Bulletin*, 1941, Vol. 38, p. 682, and, for Shanghai, 1940, Vol. 37, pp. 256, 569.] *J. W. D. M.*

LIU (Wei-t'ung) & ZIA (Samuel H.). **Studies on the Murine Origin of Typhus Epidemics in North China. II. Typhus Rickettsia isolated from Mice and Mouse-Fleas during an Epidemic in a Household and from Body Lice in the Garments of One of the Epidemic Cases.**—*Amer. Jl. Trop. Med.* 1941. Sept. Vol. 21. No. 5. pp. 605–625. With 2 figs. & 1 chart. [44 refs.]

This paper describes the investigation of a family outbreak of typhus fever in Peiping.

Between the 4th and 26th March, 8 out of 9 louse-infested persons living in a house overrun with mice were attacked. Their ages were :— 9, 10, 14, 15, 43, 46, 57, and 59 : the two oldest died, the others survived.

Four mice were trapped in the house and 12 fleas, *Leptopsylla musculi*, were collected from them. Three strains of virus were isolated—(1) from the fleas, (2) from the mice, and (3) from lice found on one of the patients.

The flea-strain of Rickettsiae was passaged for 11 generations through 20 guineapigs, of which one died and none showed a scrotal reaction. Rickettsiae were never found in smears of the tunica vaginalis of the guineapigs, but were detected in mice inoculated from a guineapig at the 5th passage. After 5 passages in guineapigs the strain was transferred to albino rats and was maintained in them for 17 generations. Five guineapigs were inoculated from these at various passages : all had typical fever and four showed pronounced scrotal swelling. Virus from a rat at the 9th passage was transferred to mice and was maintained for 5 generations.

This strain was regarded as conforming to the murine type of Rickettsia : the absence of scrotal reaction in the guineapigs used for the direct passage of the virus was not regarded as evidence against this view because several authors have reported a similar finding in some murine strains.

The mouse-strain of the virus was subjected to the same tests, but Rickettsiae could not be detected even in mice which were inoculated with virus of the 5th generation from guineapigs, and the virus died out after 8 passages in rats which were inoculated from guineapigs at the 4th passage. The authors' comment on this is "That a typhus strain isolated from house mice was incapable of surviving beyond 8 passages in rats is not in accord with the reported behaviour of the murine Rickettsia and is an entirely unexpected finding, especially in view of

the typical murine characteristics of the strain isolated from fleas of the same mice. We can offer no satisfactory explanation of this discrepancy of behaviour between the mouse and flea strains in experimental animals."

The third strain, isolated from lice found on one of the patients, corresponded in general to the mouse strain.

In the discussion the authors state that, theoretically, it is not impossible that the disease was historic typhus and that the mice had been infected from the patients, but it was difficult to see how historic virus could be transmitted from men to mice in natural conditions and also how the first patient could have become infected from outside sources seeing that he had practically never left the house. It seemed much more likely that the infection was conveyed from the house rodents to man by their fleas and then from man to man by human lice. The authors incline to the view that the initial case was caused by the bite of infected mouse fleas rather than the more usual rat fleas, though mouse fleas ordinarily do not attack man.

[The findings are open to various interpretations, but one important point emerges, that the commonly accepted criteria for distinguishing between the viruses of historic and murine typhus have been discredited in this case.

It is hardly conceivable that the virus isolated from the fleas should have been different in type from that of the mice which harboured the fleas: yet the former was transmissible indefinitely through rats and caused a scrotal reaction, while the latter died out after eight passages in rats and did not cause a scrotal reaction.] *J. W. D. M.*

TUCKER (C. B.), WOODRING (Thomas V.) & ESSICK (Harry C.). **An Outbreak of Endemic Typhus Fever in Nashville, Tennessee. Its Epidemiology and Control.**—*Amer. Jl. Public Health.* 1941. Sept. Vol. 31. No. 9. pp. 917–925. With 4 figs.

The report deals with 75 cases of endemic typhus fever in Nashville, Tennessee, a town with a population of 166,312 inhabitants.

The onset occurred in Sept., Oct., and Nov., 1939, in 67 of the cases.

The great recent increase in the number of cases is only partly explained by better diagnosis; there seems to be a spread of the disease from the Atlantic coast to the interior.

In 70 cases the probable source of infection was determined; in all of these there was an exceptional degree of association with rats in three well-defined foci of infection. The persons attacked were employees at, or visitors to, grain mills, seed stores and other buildings with large rat populations, or were persons living or working in the vicinity of such places. Only six of the patients were less than 20 years old. Whites and negroes were almost equally affected.

The clinical manifestations are of interest. A red macular or maculo-papular rash appeared on the 5th or 6th day in most cases, on the lower chest or upper abdomen: a petechial rash was only seen in 2 cases. The rash could seldom be detected in coloured patients and in two of the white patients it was absent.

The average duration of the fever was 15 days, the extremes being 9 to 40 days. There were only 2 deaths.

There was agglutination of *Proteus XI9* in dilutions of 1–160 or more in all the 73 cases in which the test was made.

Control was by centripetal rat destruction, rat-proofing of buildings and general tidying up of the premises affected.

In 1940 there were 14 cases in two of the previous foci of infection and four in a fresh focus, a dog-food factory. *J. W. D. M.*

BRIGHAM (George D.). **Two Strains of Endemic Typhus Fever Virus isolated from Naturally Infected Chicken Fleas** (*Echidnophaga gallinacea*).—*Public Health Rep.* 1941. Sept. 5. Vol. 56. No. 36. pp. 1803–1804.

The author reports the first isolations of murine virus from the chicken flea *E. gallinacea.* The first group of 135 of these fleas was recovered from two rats from a farm in Georgia ; the virus was present in a pool of these fleas and was shown to be that of endemic typhus by guineapig passage. Endemic typhus virus was also isolated from the brains of the rats and from pools of *X. cheopis* and *L. segnis* recovered from them. The owner of the farm on which the rats were caught was suffering at that time from the disease. A second strain, similarly proved to be that of murine typhus, was isolated from a pool of *E. gallinacea* from a rat in the city of Albany, Georgia. *C. W.*

BENGTSON (Ida A.) & TOPPING (Norman H.). **The Specificity of the Complement Fixation Test in Endemic Typhus Fever using a Rickettsial Antigen.**—*Public Health Rep.* 1941. Aug. 29. Vol. 56. No. 35. pp. 1723–1727.

Complement fixation tests were carried out in 15 proved and 37 clinically diagnosed cases of endemic typhus fever : there were 92 control tests in cases of other diseases including tuberculosis, leprosy, malaria, syphilis, tularaemia. typhoid fever, etc. The antigen was prepared from a wild-rat strain of Rickettsia grown in the yolk sacs of chick embryos.

In 12 of the 15 proved cases of endemic typhus there were positive reactions in dilutions ranging from 1–16 to 1–1,024 : In the other 3 the reactions were 1–4 to 1–8, but the disease had occurred from two to three years previously. In 32 of the 37 clinically diagnosed cases positive reactions occurred in dilutions of 1–8 to 1–1,024 : the remaining 5 cases were positive in dilutions of 1–2 to 1–4.

All the control cases gave completely negative reactions, except that in 7 of the 10 cases of leprosy there was slight fixation in dilutions of 1–2, and that in sera which had been stored for a long time from cases of tularaemia and undulant fever there was partial fixation in dilutions of 1–4 and 1–8. The Weil-Felix reactions of the typhus sera were positive in dilutions of 1–40 or less in most of the cases in which the disease had occurred more than a year previously.

In many of the cases in which the disease had occurred within the previous twelve months the Weil-Felix titre was low while the complement fixation titre was high, but in a number of cases there was a certain amount of correlation between the reactions.

It was concluded that the complement fixation test for endemic typhus fever is specific. *J. W. D. M.*

KOUWENAAR (W.) De Nederlandsch-Indische Rickettsiosen. [**Rickettsial Diseases of the Netherlands Indies.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Jan. 6. Vol. 81. No. 1. pp. 41–52.

WOODHEAD (L. S. F.) & DUTTA (U. C.). **A Note on Fevers of the Typhus Group in Assam.**—*Indian Med. Gaz.* 1941. July. Vol. 76. No. 7. pp. 406–407.

This investigation deals with persons living in various localities of Assam, a province from which there are no records of the occurrence of cases of typhus fever.

Sera of 203 patients suspected of having enteric fever were tested against *Proteus OX19*, *OXK* and *OX2*. Reactions considered diagnostic of a fever of the typhus group occurred in 17 cases. Of these "8 fell under the head scrub typhus, 6 were probably murine and 3 tick typhus."

The criteria were—"standard agglutination with *OXK* at 1–150 and over and with strain *OX19* at 1–125 or over: the Widal test not suggestive of the enteric group and the short history sent with the serum."

One serum was positive to *OXK*, 1–3,500; the strongest reaction to *OX19* was 1–275: in the latter case death occurred on the 11th day.

A few details are given of four typical cases in which the results of the standard agglutinations were:—

	Day of disease	*OXK*	*OX19*	*OX2*	Rash
(1)	10th	1–550	Neg.	1–17	Nil.
(2)	10th	1–55	1–275	1–27	No mention.
(3)	19th	1–3,500	1–85	1–40	Nil.
(4)	28th	1–800	1–27	1–27	Nil.

[It would be interesting to know the criteria on which the authors relied for distinguishing scrub, murine and tick typhus from each other and from epidemic typhus.] *J. W. D. M.*

GISPEN (R.). Het kweeken van rickettsiae in eendeneieren. [**The Cultivation of Rickettsiae in Ducks' Eggs.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Sept. 9. Vol. 81. No. 36. pp. 1907–1925. With 4 figs. on 1 plate. [14 refs.] English summary.

"The chorioallantois of developing ducks' eggs is very suitable for the propagation of viruses and rickettsiae. For this purpose the egg of the 'dutch runner' deserves to be given preference to the hen's egg. The following advantages of ducks' embryos are mentioned: they are more viable under laboratory conditions; virus infection causes less rapid death of the embryo; the duck's embryo requires an incubation of 26–27 days before they hatch, that is five days more than the chicken embryo; the part of the egg membrane available for inoculation is larger, it therefore produces also a larger quantity of virulent material.

"In regard to its bactericidal power for small quantities of certain non-pathogenic micro-organisms, the chorioallantois of ducks' eggs resembles the peritoneum of animals.

"Scrub typhus- and Sumatran mite fever-rickettsiae, which failed to grow on the chicken-egg membrane, can easily be propagated on

the chorioallantois of ducks' eggs. Nine cultures of scrub typhus rickettsiae have been investigated during a various number of egg passages; in one case twenty passages were made.

"These rickettsiae produce big round prominent foci, which appear five days after the inoculation and have been completely developed on the 7th–8th day. The central portion of some foci shows a collapse like the umbilication of a smallpox pustule.

"Sections of the infected membranes show very extensive inflammatory changes in the mesodermal and ectodermal layer with numerous eosinophil leucocytes.

"The effects of some factors influencing the membrane lesions are described.

"Numerous rickettsiae of the 'orientalis' type are found in various cells of the chorioallantois and out of them.

"The liver and the spleen of the embryo may also show many rickettsiae, especially in macrophage-like cells. As an exception a few rickettsiae are found in the cerebrum of the embryo. Histologically these internal organs did not show any changes. These findings are different from those made in the same organs of infected animals, which show as a rule histologically distinct lesions, but microscopically no rickettsiae.

"The embryo dies about ten days after the inoculation showing by autopsy neither ascites nor other changes. Young ducks inoculated intraperitoneally with scrub typhus rickettsiae from infected guineapig-brains and egg membranes did not show clinical symptoms; therefore they have a natural immunity for infections with certain germs, which are pathogenic for the embryo of the same species.

"The egg passage strains have been tested for virulence to mice and guinea-pigs, but no changes in virulence have been observed after one to twenty passages. The egg membrane, the internal organs and the heart blood of the embryo are infectious for mice.

"The localization of the rickettsiae in the animals infected with egg passage strains is just the same as in animals inoculated with a guinea-pig strain; therefore the organotropism in animals has not been changed. The different localization of rickettsiae in the duck's embryo is due to the particular portal of entry.

"The chorioallantois may show a higher titer of infection for mice (10_7) than the embryo liver and the cerebrum of infected guineapigs (resp. 10_5 and 10_4).

"The egg-membrane technique is also suitable to the titration of rickettsiae-containing material, but the titers found in this way are smaller than those for mice.

"The sera of eight infected embryos were tested on agglutinins for proteus OX Kingsbury and OX_{19}—eight to fourteen days after the inoculation—with negative result.

"With the aid of the egg-membrane technique the Sumatran mite fever rickettsiae cannot be distinguished from scrub typhus rickettsiae. This supports the opinion that the germs of these diseases are identical."

TOPPING (Norman H.). **Rocky Mountain Spotted Fever. A Note on Some Aspects of its Epidemiology.**—*Public Health Rep.* 1941. Aug. 22. Vol. 56. No. 34. pp. 1699–1703. With 1 fig.

This paper is of interest because it fully succeeds in its obvious purpose, to dispose of the widespread misconception that Rocky

Mountain spotted fever is a less virulent disease in the eastern than in the western States of the U.S.A. The author shows that when the incidence of the disease in different age groups is taken into account the case-mortality is as high in Maryland and Virginia as in Montana and Idaho. [It is generally stated in text-books that the Montana type is much more fatal than the Idaho type, and this is true in so far as from parts of Western Montana fatality rates of 70–80 per cent., and from parts of Idaho of only 5 per cent. have been recorded. Figures quoted by the author, however, show that the fatality rates in these two States, each as a whole, were 24·0 in Montana and 34·4 in Idaho, over a 10-year period.]

The percentage of incidence is much higher among children in the east than in the west, while among males of 40 years and over it is much higher in the west than in the east. This striking difference in incidence seems to be explained by variations in the degree to which persons of different age and sex groups are exposed to bite by infected ticks in the areas concerned.

Great variations are shown to occur in the virulence of the infection both in the eastern and western States.

Till recently the eastern strains which had been isolated had been of low virulence to guineapigs, causing little mortality and no consistent scrotal reactions, but in 1940 the author reported a case from Virginia of a patient who "was not critically ill," from whom a strain was isolated which caused a mortality of 80 per cent. and typical scrotal reactions in guineapigs. More recently two highly virulent strains were isolated from patients in Georgia. In 1940 a mild strain was isolated from a patient in Colorado, a western State: this caused a mortality of only 4·4 per cent. and no consistent scrotal reactions in guineapigs.

It has, therefore, been shown that in both the eastern and western States the strains of Rickettsiae may be very mild or very virulent, whether judged by animal experiments or by fatalities in human beings. *J. W. D. M.*

LILLIE (R. D.). **Pathology of Rocky Mountain Spotted Fever. I. The Pathology of Rocky Mountain Spotted Fever. II. The Pathologic Histology of Rocky Mountain Spotted Fever in the Rhesus Monkey** *Macaca mulatta.—Nat. Inst. Health Bull. No. 177.* Wash. pp. vi+59. With 36 figs. on 25 plates. [17 refs.]

Part 1 of this bulletin contains an account of the gross and microscopical anatomy of Rocky Mountain spotted fever. The findings in 19 autopsies are summarized and brief notes are given of all the previous records which bear on the subject.

It is quite impossible to give an adequate summary of the closely packed information contained in the 27 pages of the bulletin: those who are interested must see the original report which, taken in conjunction with the beautifully illustrated article by WOLBACH in the *Journal of Medical Research* [1919, Vol. 41, p. 1, this *Bulletin*, 1920, Vol. 16, p. 420] contains everything of importance that is known of the subject.

From the brief clinical notes it appears that there was a clear history of bites by one or more ticks in 7 of the 19 cases reported, of handling ticks from dogs or the clothing in 4; no mention is made of ticks in the remaining 8 cases.

The Weil-Felix reaction was positive in dilutions ranging from 1–40 to 1–5,120 in 8 cases, " positive " in 1, negative on the 5th and 10th days, respectively, in 2, and was not mentioned in the other 7 cases. In one case the Weil-Felix was negative on the 11th day and positive 1–1,280 on the 14th day : in another it was negative on the 14th day and positive 1–1,280 on the 19th day. [The strain of Proteus used is not mentioned.]

Death occurred after 7 to 10 days of illness in 6 cases, after 11 to 13 days in 8, and after 15 to 24 days in 5.

When death occurred before the 10th day there were only vague signs of rash in the dead body ; in persons who died after 10 days a petechial eruption was evident. Jaundice was seen in 3 cases. Petechial eruptions of the serous membranes, especially of the visceral pleura, were seen in 6 cases. The lungs were slightly affected in persons who died early in the course of the disease ; in the later cases there were usually congestion, pleural effusion and areas of consolidation. Purpuric foci were often seen in the mucous membranes of the stomach or intestines. The spleen was enlarged, to a greater degree when death occurred early ; its colour was deep purplish-red ; its consistency varied, being soft when death occurred late. Haemorrhages were seen in the testes of one juvenile case and congestion of the epididymes in another. Cerebral congestion and injection of the meninges were seen in 13 out of 15 cases.

Some of the microscopical changes were as follows :—In the skin every case had numerous perivascular foci of lymphocytic infiltration. There was swelling of the capillary endothelium in 10 and concentric proliferation in 7 of 14 cases ; usually both of these lesions occurred simultaneously. Thrombosis of the arterioles and venules was found only in 4 cases.

Rickettsiae were found in varying numbers in the vascular endothelial cells in most of the cases in which the examination was made in favourable conditions.

Focal lesions were found throughout the brain in all cases fatal after the 12th day, but only occasionally in the earlier fatal cases. The brain lesions were of the same type as those of the skin, but in about half of the cases there were perivascular haemorrhages. Infarcts were found in the small vessels in all cases fatal after the 11th day.

The lesions were essentially similar in cases of the eastern and western types.

Part II deals with the findings in 26 autopsies made on *rhesus* monkeys.

The lesions were very similar to those in human beings. Brain involvement was less frequent and there were other minor differences.

Both parts of the bulletin are well illustrated with excellent reproductions of photomicrographs. *J. W. D. M.*

HUTTON (Jack G.). **Rocky Mountain Spotted Fever.**—*Jl. Amer. Med. Assoc.* 1941. Aug. 9. Vol. 117. No. 6. pp. 413–416.

This is a good clinical account of the disease. Only a few points call for special notice. One is that—" not infrequently the site of the bite (by a tick) cannot be found." This is a matter of practical importance because it is sometimes held that absence of positive evidence of tick bite is strong evidence against a diagnosis of tick-borne typhus.

The case mortality rates of the "eastern" and "western" types of the disease are reported to be 18·1 per cent. and 19·4 per cent., respectively; the only difference between the two types is that the vectors are not the same.

Convalescent serum is stated to "have shown no definite specificity in treatment." Codeine is said to be the drug of choice in treatment of restlessness and insomnia. *J. W. D. M.*

CASTANEDA (M. Ruiz) & SILVA (Roberto). **Immunological Relationship between Spotted Fever and Exanthematic Typhus.**—*Jl. Immunology.* 1941. Sept. Vol. 42. No. 1. pp. 1–14.

Guineapigs which had recovered from inoculation with the viruses of epidemic and murine typhus fever showed a high degree of resistance to virulent strains of virus of the Rocky Mountain spotted fever.

In the course of transfers of the spotted fever virus through guineapigs which had recovered from "orchitic" (murine) typhus only 1 of 24 died, whereas 8 of 10 control animals died. So also 4 of 19 animals which had recovered from inoculations with the virus of epidemic typhus died against a death rate of 90 per cent. in controls. A few animals which had recovered from spotted fever infection showed a considerable degree of protection against epidemic and murine typhus viruses.

Sera from 7 cases of Rocky Mountain spotted fever were tested for agglutination against *Proteus X19* and *R. prowazeki*: 6 were positive to the former and all 7 to the latter. Sera from guineapigs infected with spotted fever showed a higher degree of opsonic power against *R. prowazeki* than normal animals, but not nearly so high as the sera of animals infected with epidemic typhus.

The conclusion reached was that "there is a definite immunological overlapping between spotted fever and typhus infection."

J. W. D. M.

DE MAGALHÃES (Octavio). Tifo exantematico em Minas Gerais. Pesquizas de Laboratorio. [**Laboratory Findings in the Typhus Fever of Minas Geraes.**]—*Arquivos do Inst. Biol.* Buenos Aires. 1940. Vol. 11. pp. 203–214. French summary (10 lines).

Details are given of the results of examinations of the blood, urine and cerebrospinal fluid in a considerable number of cases of typhus fever of Minas Geraes (tick-borne-typhus).

Some of the more important findings are as follows:—

In 71·4 per cent. there was leucocytosis; leucopenia was quite exceptional. In one case the leucocytes increased from 7,400 to 59,800 within 48 hours. In the early stages the chief increase was in the neutrophils, later the monocytes showed the greatest increase, and later still the lymphocytes. There was a striking diminution or complete absence of the eosinophils and basophils in more than 95 per cent. of the cases. There was a slight degree of anaemia with a high colour index in most of the cases, but on one occasion a total red cell count of about 10,000,000 was recorded.

In severe attacks the blood urea was always high; in one case it was 205 milligrammes per cent. and it was never less than 39 milligrammes.

In mild attacks there was little or no increase in the blood urea. Acidosis was pronounced ; the icteric index was high, indicating an early tendency to hepatic insufficiency.

The urine was scanty, and contained traces or moderate amounts of albumin with tube casts in most of the cases. Urea was diminished in 80 per cent. and there was chloride retention in 99 per cent. Red blood corpuscles were found in the urine in more than half of the cases.

The cerebrospinal fluid usually showed an increase in albumen, globulins and lymphocytes, and in 22 out of 30 cases red blood corpuscles were found. *J. W. D. M.*

DE MAGALHÃES (Octavio). **The Diagnosis of Exanthematous Typhus of Brazil in Minas Geraes.**—*Jl. Trop. Med. & Hyg.* 1941. Oct. 15. Vol. 44. No. 20. pp. 134–139. With 3 figs.

Three fatal cases are described of a fever, variously designated in the article as "exanthematous typhus of Brazil," "exanthematous fever," and "exanthematous typhus of Minas Geraes."

In these cases a reliable diagnosis would have been impossible on clinical grounds or even after a post-mortem examination, but was easily made by intraperitoneal inoculation of the blood into guineapigs. The animals responded with typical fever and scrotal reaction.

In the discussion the author states that he has carried out this test on guineapigs and rhesus monkeys in 110 cases of the disease with only one failure ; and this resulted from the lateness of the stage at which the blood was taken.

He also states that he has never seen a case in which a similar reaction has followed the application of the test to any other fever.

He claims that a negative response in guineapigs or rhesus monkeys "dismisses the hypothesis of exanthematous typhus of Minas Geraes."

Apparently no cases were seen in which inoculated guineapigs showed mild, non-orchitic reactions such as have been recorded not infrequently in the Rocky Mountain spotted fever, whose virus is now regarded as being indistinguishable from that of the typhus fever of Minas Geraes. *J. W. D. M.*

GEAR (James) & DE MEILLON (Botha). **The Hereditary Transmission of the Rickettsiae of Tick-Bite Fever through the Common Dog-Tick,** *Haemaphysalis leachi.*—*South African Med. Jl.* 1941. Oct. 11. Vol. 15. No. 19. pp. 389–392. With 2 figs.

In two series of experiments hereditary transmission of the Rickettsiae of tick-bite fever (South African tick-borne typhus), through the eggs of *Haemaphysalis leachi* to the 3rd and 4th generations was demonstrated.

It was presumed that transmission might continue through an indefinite number of generations. Larval, nymphal and adult ticks were found to be infective. Nymphs transmitted infection up to the age of 5 months. It was concluded that the tick might act as a reservoir of infection for indefinite periods of time and might infect man at any stage of its life. *J. W. D. M.*

VEINTEMILLAS (Félix). La vacunación del Tifus altiplánico mediante el antígeno murino mexicano. [**Vaccination against Altiplanic Typhus Fever by Murine Virus.**]—*Suplemento d. Inst. Nac. Bact.* La Paz, Bolivia. 1941. June. pp. 5–39. With 11 figs. English summary.

[The name "altiplanic typhus" means typhus of high altitudes; it has been applied to the louse-borne typhus of Bolivia by the author, who justifies its use by stating that it conforms to "the nomenclature of the League of Nations since 1936."]

Several series of experiments on guineapigs and human volunteers are reported; following are some of the conclusions:—

(1) No cross immunity exists between the virus of altiplanic typhus and the virus of Rocky Mountain spotted fever.

(2) Blanc's live murine vaccine did not produce satisfactory immunity against altiplanic typhus in guineapigs and human beings. Of 8 volunteers who were vaccinated with this virus 4 were found to be susceptible to inoculation with the virus of louse-borne typhus, while the other 4, who were immune, had been under treatment for espundia with a special preparation containing iodine and tartar emetic; the author suspects that they owed their immunity to these drugs.

(3) *Triatoma infestans* can transmit the virus of epidemic typhus in laboratory conditions, but no reference is made to the experiments on which this statement is based.

(4) Large doses of killed murine virus prepared by CASTANEDA from the lungs of infected rats or white mice gave a sound immunity against altiplanic virus, both in guineapigs and in 10 human volunteers. Three doses of the virus were given at weekly intervals; small doses gave incomplete protection to guineapigs.

Two sets of field trials of the vaccine were carried out: in the first of these about 1,000 persons were given two relatively small doses during an epidemic of typhus fever; 55 were attacked, 14 after the first dose and 42 after the second.

In the second trial large doses were given to more than half the members of a community of 400 persons living in an area where typhus fever had not been known to occur, so that the results will not be known till the disease occurs in the locality. Rather severe reactions were reported in a number of the cases after the second dose of the vaccine and police intervention had to be sought before the subjects could be "persuaded" to receive the third dose.

The author expresses his satisfaction at the solution of the problem of anti-typhus vaccination and makes an eloquent appeal for greater facilities for the production of the vaccine on a large scale.

J. W. D. M.

HUDSON (N. Paul). **Protection of Guinea Pigs against Mexican Typhus Virus by Vaccine from Infected Rat Lungs (Castaneda).**—*Proc. Soc. Experim. Biol. & Med.* 1940. Oct. Vol. 45. No. 1. pp. 40–43. With 1 chart.

Ten guineapigs were inoculated by Castaneda's method with varying doses of phenol-killed Rickettsiae of the "L" Mexican strain obtained from the lungs of infected white rats. Eleven days later the animals were inoculated with large doses of live Rickettsiae of the same strain

one died of an intercurrent infection, the other 9 had neither fever nor scrotal reaction. Four control animals were given doses of live Rickettsiae half as large, all had fever and scrotal reactions.

Small single doses of the vaccine (0·2 cc.) seemed to give as much protection as large repeated doses (up to 1·0 cc. repeated four times at intervals of five days). *J. W. D. M.*

MAGERL (J. F.). Ueber Fünftagefieber (Wolhynisches Fieber). Symptomatologie und Heilung mit Eubasinum. [**Five-Day Fever (Wolhynian Fever), Symptomatology and Treatment with Eubasinum.**]—*Klin. Woch.* 1941. July 12. Vol. 20. No. 28. pp. 711–714. With 2 figs.

The article deals with four cases of fever which were promptly cured by intravenous injections of sulphapyridine (eubasinum).

The cases were diagnosed as trench fever, but, as will be seen later, the evidence on which the diagnosis was based is not convincing. One case is described in detail: the patient had returned from Poland four months before the onset; lice had never been found on him nor on any of his associates. He had 19 spells of fever which came at regular intervals of three days except on two occasions when the periodicity was of the four-day type. One of the spells lasted 24 hours, all the others were of 12 to 14 hours' duration. The chief symptoms were severe headache, hyperaesthesia of the skin, and severe pains, which at first were localized chiefly in the hip joints and lower abdomen but later extended to the other joints. All the symptoms disappeared during the intermissions of the fever so that the patient could go for long walks.

Malaria was excluded by the failure to find parasites and by the absence of response to quinine. [No mention is made of the dosage of quinine or of any test to exclude the possibility of evasion of the drug by the patient.]

The leucocyte count was 5,000 to 8,000 during the intermissions, but reached a figure of 20,000 at the height of the fever. A fleeting rash was seen after three of the spells of fever: on the forearms this was like a painful erythema nodosum, on the abdomen it was roseolar.

On the day of the last spell of fever and the following four days the patient was given intravenous injections of eubasinum in doses of one gramme twice daily. After a temporary exacerbation the symptoms disappeared and the patient was fit for duty within three weeks of the first injection.

Very brief details are given of the other cases: one patient had five spells of fever, another had six; the periodicity was of the three-day type, except on one occasion when it was of the four-day type in one of the cases. There were severe pains, chiefly in the wrists and ankles, during the paroxysms of fever. There was no rash.

The fourth patient had symptoms suggestive of rheumatic polyarthritis. No mention is made of the number of spells of fever or of the periodicity, but the latter must have been tertian because in the discussion it is stated that this type of fever occurred in one of the cases. Eubasinum, given once daily in doses of one gramme dissolved in 10 cc. of normal saline by the intravenous route, effected a prompt and lasting cure in the last three cases. Three doses were given in one case, four in the other two.

The author bases the diagnosis of trench fever on the recurring spells of fever with severe pains in the joints, on the exclusion of malaria and the absence of evidence of sepsis. He suggests a trial of cubasinum in other rickettsial infections and in protozoal fevers.

[In view of the rarity of tertian and quartan fever in diseases other than malaria, fuller details would have been expected of steps to exclude malaria. The response to sulphapyridine is in keeping with a diagnosis of malaria; CHOPRA and his co-workers have recently shown that this drug may be effective in all forms of the disease (this *Bulletin*, 1940, Vol. 37, p. 503).

Even if the statement is accepted that "malaria was easily excluded," there are serious objections to the diagnosis of trench fever. Since 1918 this disease has been so rare that the occurrence of four unconnected cases would be remarkable: in the absence of any evidence of louse-infestation of the patients or their associates it would be almost incredible. Also the periodicity of these attacks is quite different from that described as characteristic of the relapsing form of trench fever in which it was of the five or six day type as opposed to the two or three, exceptionally four, day type reported in the present series.

The names "febris quintana" and *Rickettsia quintana* may have been responsible for some confusion; on the analogy with malaria these suggest a periodicity of four days instead of the prevailing five or six day type.

The reviewer does not exclude the possible occurrence of a non-malarial quartan fever: he once saw a case of persistent quartan fever in Calcutta in which no parasites were found after repeated search by the late Lt.-Col. KNOWLES; quinine in doses of 10 grains thrice daily for several days failed to control the fever, but a single injection of neosalvarsan effected a prompt and lasting cure.

Unfortunately, animal inoculations were not carried out in this case nor in any of the cases under review; their features suggest the possibility that the virus may have been a spirochaete.

Drugs of the sulphanilamide type will doubtless be tried in spirochaetal and rickettsial fevers; the results will be of great interest.]

J. W. D. M.

WERNER (H.). Ueber die Rickettsien des Fünftagefiebers. [**The Rickettsiae of Trench Fever.**]—*Arquivos do Inst. Biol.* Buenos Aires. 1940. Vol. 11. pp. 601–605.

In a historical review of trench fever the author refers to OGATA'S success in cultivating *Rickettsia quintana* in the testicles of guineapigs, and to the same worker's use of the cultivated virus in the treatment of cerebral syphilis, a procedure first suggested by the author himself. Werner holds that *R. quintana* is preferable to malaria parasites as a therapeutic agent in the following two respects, (1) freedom from risk to life, (2) avoidance of the necessity for treatment of the infection.

Any risk of spreading infection by the virus can easily be obviated by simple precautions. *J. W. D. M.*

ANDERSON (W. M. E.). **Clinical Observations on Sandfly Fever in the Peshawar District.**—*Jl. Roy. Army Med. Corps.* 1941. Nov. Vol. 77. No. 5. pp. 225–239. With 1 fig. [10 refs.]

The most interesting feature of this report is that it contains an account of an attempt to diagnose sandfly fever by making cultures of

the virus in the chorio-allantoic membranes of chick embryos, by means of the technique introduced by SHORTT. [See this *Bulletin*, 1939, Vol. 36, p. 483; 1940, Vol. 37, pp. 273, 853; 1941, Vol. 38, p. 208.]

During 1938–1939 samples of serum were taken from 132 patients suspected of having sandfly fever; as far as possible the specimens were collected on the first day of the fever.

A portion of each sample was dried and sent to the King Institute, Guindy; in most cases a portion was also examined by Shortt's technique at Peshawar. The sera were stored in a refrigerator, sometimes for several weeks before inoculation; the specimens sent to Guindy went by post at the hottest time of the year and took five days in transit.

The "combined results" of the inoculations were positive cultures in 78, doubtful in 14, and negative in 40.

Subsequent reconsideration by the author of the 54 doubtful and negative cases enabled him to exclude nine on the grounds of error in diagnosis: in 26 others it was thought that the fever might have been caused by influenza (four cases), the combined effects of chill and indiscretions in diet (11 cases), or "the effects of heat" (11 cases). The remaining 19 patients were considered to have had sandfly fever, and of these seven had given doubtful, and 11 negative, responses to the cultural test.

The explanation suggested for these failures was—"for some reason not clearly understood the virus did not produce definite lesions or failed to remain viable on storage."

[The report shows that in conditions such as are described, little importance can be attached to negative findings.]

The signs and symptoms observed in the 78 positive cases are described; these were of the usual type, but secondary rises of temperature, occurring at least 24 hours after the end of the first phase and lasting 12 to 24 hours, were seen in 9 cases.

Reference is also made to five cases resulting from the inocultaion of blood from patients into volunteers; the incubation period was 6 to 10 days and a secondary rise occurred in one case. *J. W. D. M.*

JIMÉNEZ (José F.). **Carrion's Disease. I. Some Growth Factors Necessary for Cultivation of** *Bartonella bacilliformis.*—*Proc. Soc. Experim. Biol. & Med.* 1940. Oct. Vol. 45. No. 1. pp. 402–405. [10 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Hitherto Noguchi's semi-solid serum agar medium, designed for cultivation of leptospira, has been used for *Bartonella bacilliformis.* Growth could not be obtained on solid media without addition of blood. The author set out to determine whether *x* or *v* growth factor or both were necessary. An aqueous extract of yeast, prepared by Lwoff's method, was the source of the *v* factor and was used in a proportion of 0·1 per cent. in 1 per cent. glycerine infusion agar. For the *x* factor 5 per cent. defibrinated rabbit's blood was added to the medium; agar plates containing these factors, separately and together, were inoculated with four strains of *Bartonella bacilliformis*, and incubated at 25°–28°C., the *p*H of the medium was 7·2–7·6. Growth ceased if the medium became dry, so the plates were sealed with rubber.

Small translucent colonies were visible to the unaided eye by the third or fourth day; on the third if both *x* and *v* were present in the

glycerine agar, on the fourth or later if x factor alone were present; there was no growth if v alone was present. It would seem, therefore, that the organism can produce its own cozymase but cannot synthesize the x factor.

Other solid media were tried with success; two are specially mentioned.

1. *Blood-glucose-cystine agar*, made by adding 0·1 per cent. cystine and 1 per cent. glucose to autoclaved beef-infusion agar, and sterilizing in flowing steam for an hour on two days. Before the plates are poured fresh defibrinated rabbit's blood is added to 5 per cent. Colonies were numerous, discrete, and clearly visible by the third day.

2. *Defibrinated rabbit's blood infusion agar with* 1 *per cent. glycerine* also gave abundant growth by the third day.

A four- or five-day growth on any of these was equivalent to a 15- to 20-day-old culture on Noguchi's leptospira medium.

Macroscopically, two types of colony were observed: (1) Small, round, mucoid, clear colonies sometimes becoming confluent, and adhering to the medium; (2) Opaque, finely granular, but mucoid film also adherent to the medium. Microscopically, there was considerable pleomorphism, some being finely granular and in masses, others as small bacillary forms. *H. H. S.*

Del Ponte (Eduardo). La verruga peruana o enfermedad de Carrión.—*Crónica Méd.* Lima. 1941. Apr. Vol. 58. No. 934. pp. 100–106.

CHOLERA.

Lal (R. B.); Raja (K. C. K. E.); Satya Swaroop; Basak (K. C.). **Statistical Inquiry into the Epidemiology of Cholera in Bengal. Part I. A General Review of the Epidemiological Features of Cholera in Different Parts of Bengal** [Lal, Raja & Satya Swaroop].—*Indian Jl. Med. Res.* 1941. July. Vol. 29. No. 3. pp. 425–440. With 4 maps. **Part II. Formation of Homogeneous Cholera Districts** [Lal, Raja, Satya Swaroop & Basak].—*Ibid.* pp. 441–463. With 8 maps. **Part III. Endemicity and Epidemicity of the Homogeneous Cholera Districts** [Satya Swaroop, Raja, Lal & Basak].—*Ibid.* pp. 465–482. With 1 map.

Part I.—The well known recognition of Bengal as the endemic home for cholera in India forms the first statement in this communication. Reference is also made to the belief that epidemics originating from Bengal have occasioned pandemics involving the greater part of the inhabited globe.

It is to the extensive area comprising Assam, Bengal and Orissa that the authors devote their attention as one, and indeed the chief, endemic centre of cholera. The area in question covers 146,000 square miles and, naturally, it is asked whether this huge area is homogeneous in composition and whether any heterogeneity present is correlated with obscure points in the epidemiology of cholera. Unfortunately the only data, although probably the most reliable of

the data available, for statistical study are the cholera mortality figures. The districts of Bengal were classified, on the basis of a mean cholera rate for the whole province of 1·92 per mille, into (1) those of low mortality rates, 0 to 0·96, (2) moderate rates, 0·96 to 1·92, (3) high rates, 1·92 to 2·88, and (4) very high rates 2·88 and over. In the summary of the statistical findings it is stated that : (1) " The districts of Bengal present considerable heterogeneity in regard to their cholera experience and that there are evidences of heterogeneity within the districts themselves." (2) " The necessity of undertaking an inquiry with a view to forming homogeneous cholera districts in connection with the study of the natural history of the disease " has become obvious.

Part II.—In the attempt to sort out homogeneous cholera districts the *thanas*, and especially contiguous *thanas*, are selected as the units for determination of numerical similarity. The cholera experience in this type of investigation is set out in terms of (1) the mean incidence and (2) the variability of incidence round the mean. Demonstration of this experience is on strictly statistical lines and there is excellent pictorial presentation of the results in a series of 8 maps. Three variables are involved in the statistical analysis. These are described, for variability of cholera incidence, as seasonal, yearly and residual. What may be stated as conclusion is as follows : " It is believed that the re-distribution of the area into homogeneous cholera districts gives a basis for investigation of the underlying factors in the natural history of cholera which are responsible for the observed variations."

Part III.—With the field of investigation thus cleared by definition and enquiry the authors proceed to test the endemicity and epidemicity of their homogeneous cholera districts, again by well recognized statistical procedure. " A frequency distribution of varying intervals of absence of cholera has been worked out for each *thana* individually and for the *thanas* constituting each homogeneous district collectively." The " net endemicity," determined by the method of partial regression to eliminate factors such as differences in population, area and the number of *thanas* to a district, has been used to classify the homogeneous districts into endemic and non-endemic. " The epidemic and endemic characters of various homogeneous cholera districts of south-west Bengal have been defined." *W. F. Harvey.*

ORISSA : ANNUAL PUBLIC HEALTH REPORT FOR YEAR 1939 AND ANNUAL VACCINATION REPORT FOR YEAR 1939–40 [VERGHESE (G.), Director]. [**Cholera** pp. 5–7. With 1 folding chart. **Fairs and Festivals** pp. 10–12.]

There is little doubt that 1939 was an epidemic cholera year in the province of Orissa. Thus the total deaths from cholera during the year were 11,141 as compared with 1,309 in 1938. It was the coastal deltaic districts which suffered most and these are the districts which in great measure remain submerged during the rains. If infection starts in a village it is difficult to control before it reaches epidemic proportions. Practically all the main sources of drinking water supply are open to gross contamination. The usual preventive methods of inoculation and disinfection of water sources, excreta and belongings are always adopted. It would seem, however, that for permanence of effect steps should be taken for provision of pure drinking water

" by sinking large numbers of deep masonry wells in preference to other sources and means of supply . . . . Otherwise all money spent to take temporary preventive measures by the appointment of additional staff, purchase of medicines, disinfectants, vaccines, etc., will be a mere waste as it has been in the past." Fairs and festivals are noted for outbreaks of cholera and the famous Jagannath temple attracts pilgrims in large number from all over India. The most famous and important of the pilgrim *melas* are the Snan, the Car and the Return Car festivals held in Puri. These were attended by about 45,000, 65,000 and 70,000 pilgrims respectively. *W. F. H.*

POLLITZER (R.), YAO (H. Y.), LAI (D. G.) & CHEN (S. K.). **The 1939 Cholera Epidemic in Yunnan Province with Special Reference to Kunming City.**—*Chinese Med. Jl.* 1941. May. Vol. 59. No. 5. pp. 457–467. With 2 maps & 2 charts.

The 1939 cholera epidemic, which broke out in Kunming, the capital of Yunnan Province, was traced initially to two chauffeurs arriving there from Kweichow on July 15th. In the succeeding 5 months 3,486 cases with 2,515 deaths were reported in the province and 436 of these cases occurred in Kunming City. Investigation was made of water supply, food and drinks and the contact between cases ; several causes were incriminated as responsible for the spread of the epidemic in the city. Statistics collected to determine the value of inoculation showed 16 cases in the inoculated group of 80,000 as compared with 308 cases in the non-inoculated population of about 120,000.

W. F. H.

KUBOTA (K.). **The 1939 Asiatic Cholera Epidemic in Kwangchow Shih.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1941. June. Vol. 40. No. 6. [In Japanese pp. 1070–1097. With 2 charts. [22 refs.] English summary p. 1097.]

The English summary refers briefly to an outbreak of cholera in Canton from May to October 1939, during which there were 214 cases with 110 deaths. Eight carriers were detected but information as to what constitutes a carrier is not given in the summary. *C. W.*

SANYAL (S. N.). **The Epidemiology of Cholera. A New Conception.**—*Calcutta Med. Jl.* 1941. July. Vol. 38. No. 7. pp. 349–360. With 7 graphs. [25 refs.]

READ (W. D. B.) & PANDIT (S. R.). **Distribution of *V. cholerae* and El Tor Type Strains in Certain Rural Areas in India.**—*Indian Jl. Med. Res.* 1941. July. Vol. 29. No. 3. pp. 403–418. With 1 sketch & 1 diagram.

Active investigations are being carried on, especially in British India, into the specific characterization of the cholera and El Tor vibrios. This communication takes up the question from the point of view of the distribution of the agglutinable vibrio throughout an

entire year " in the general population and water sources of a rural area in one of the ' endemic ' cholera districts of the delta of Bengal." Control investigations are included, representing (1) an "epidemic" area in Bihar and (2) a non-cholera area in Sind. " The term agglutinable vibrio is used throughout to designate a strain agglutinable with pure ' O ' serum of O group I (Gardner and Venkatraman 1935) including sub-types Inaba and Ogawa." Some of the details of the persistence of the non-haemolytic and the occurrence of the haemolytic agglutinable vibrio are highly important. The general findings set out the main points of evidence and some tentative conclusions: "The non-haemolytic agglutinable vibrio was found in all except one of the clinical cases in areas where the presence of cholera could be established . . . . About 7 per cent. of close contacts of cholera proved positive and about 16 per cent. of water sources in direct contact with cases were positive . . . ." Carriage of the cholera vibrio whether by case, contact case or water supply seems to have been only of short duration: " There was no evidence of persistence in any source much over one fortnight . . . . On the other hand the non-haemolytic vibrio with one or possibly two exceptions was not found in the absence of the disease." El Tor vibrios have been found by the authors: " The haemolytic agglutinable vibrio, while detected in the presence of the disease, has been found usually in its absence. It has been found in cholera areas of two different epidemiological types in different provinces of India and in relatively large numbers in an area which must be taken as not only free from cholera during the period of investigation but free from cholera during the decade previous. The findings in these respects so far are out of line with those described in Celebes Islands."

The authors themselves issue a cautionary note regarding too great generalization of these findings and the technical difficulties of isolation of small numbers of the agglutinable vibrios from natural sources. *W. F. H.*

VENKATRAMAN (K. V.), KRISHNASWAMI (A. K.) & RAMAKRISHNAN (C. S.). **Occurrence of Vibrio El Tor in Natural Sources of Water in the Absence of Cholera.**—*Indian Jl. Med. Res.* 1941. July. Vol. 29. No. 3. pp. 419–424.

A close relationship between the occurrence of a haemolytic agglutinable vibrio, that is to say an El Tor vibrio, and its causal relationship to an epidemic of cholera in the Celebes island of the Netherlands Indies has greatly stimulated the renewal of interest in the significance of this vibrio. The authors in this communication place on record " the repeated finding of vibrio El Tor in open natural water sources in . . . South India in the complete absence of cholera in the region . . ."

This finding was based not only on notifications of cholera but also on the " examination of 1,827 stool specimens from the inhabitants of the districts " and 237 natural sources of water. It is summarized in the statement: " The isolation of haemolytic agglutinable vibrios (vibrio El Tor) from 15 open natural water sources in two rural areas . . . in the absence of cholera is recorded."

The isolation of " non-haemolytic agglutinable vibrios indistinguishable from true *V. cholerae* " from " two other sources in the same area " is also worth noting. *W. F. H.*

GUINDY: REPORT OF THE KING INSTITUTE FOR THE PERIOD FROM 1ST OCTOBER, 1939 TO 30TH SEPTEMBER, 1940. pp. 32-34.—**Madras Cholera (Field) Enquiry** [VENKATRAMAN (K. V.)], **under the Director, King Institute, Guindy.**

Examination of 761 specimens of water from 230 sources (mostly tanks) yielded agglutinable vibrios in 21 specimens, 13 of which were of Ogawa and eight of Inaba type. Twenty of these strains were haemolytic on first isolation but there were considerable variations in haemolytic property on later examination. If examinations were repeated the type of vibrios remained the same. Cholera vibrios in 2 per cent. salt solution containing 1/50,000 peptone with a *p*H initially of 9·2 survived for as long as 198 days and still retained their original "smooth" and agglutinable character. Work was carried out to discover a preservative for stool specimens collected at a distance for despatch to the laboratory. The best of these was a boric acid-potassium chloride-buffer saline, with the help of which the *p*H of the stool could be maintained for a considerable time. In one case the cholera vibrio could be recovered from the preserved stool for 21 days.

W. F. H.

SHILLONG: KING EDWARD VII MEMORIAL PASTEUR INSTITUTE AND MEDICAL RESEARCH INSTITUTE TWENTY-THIRD ANNUAL REPORT FOR YEAR ENDING 31ST DECEMBER 1939 [ANDERSON (L. A. P.), Director]. pp. 5–7.—**Cholera Enquiry under the Indian Research Fund Association.**

Experiments were carried out on the reversion of water vibrios to true cholera vibrios. The basis of this investigation was the idea that some water vibrios occurring in nature might have been produced from the cholera vibrio by the action of bacteriophage. If their bacteriophage resistance could be removed it seemed possible that they would revert to the cholera vibrio. The removal was attempted by growing water vibrio strains in the presence of appropriate antiphage sera but the reactions of the vibrios were not changed by this procedure.

W. F. H.

GOHAR (M. A.). **The Bacteriostatic, Bactericidal and Possible Chemo-Therapeutic Properties of Potassium Tellurite with Special Reference to a Method for the Isolation of the Cholera Vibrio.**—*Jl. Trop. Med. & Hyg.* 1941. Aug. 1 & 15. Vol. 44. Nos. 15 & 16. pp. 96–99; 106–107.

The differential effect of potassium tellurite on groups of organisms has been used to inhibit the growth of certain bacteria in culture media while permitting that of others. In the present study its bacteriostatic and bactericidal action in varying dilutions has been determined in the presence and absence of serum, and its usefulness for the isolation of the comparatively resistant cholera vibrio. The best method for this latter purpose was to inoculate ordinary alkaline peptone water containing 1 in 1,000,000 pot. tellurite with the cholera stools, incubate 8 to 10 hours at 37°C. and plate out on Vedder and Van Dam's medium, containing 1 per cent. haemoglobin and 0·12 per cent. glycocol. The bacteriostatic action of pot. tellurite is only slightly interfered with, but its bactericidal action is greatly interfered with in the presence of serum.

The proven sensitiveness to pot. tellurite of members of the *Bacterium* group of organisms suggested its trial as a therapeutic agent. A suggestion is also made that substitution of tellurium for sulphur in sulphonamides might furnish a preparation especially effective against the *Bacterium* group. " The *in vivo* effect of potassium tellurite alone and in combination with dyes which are known to possess either a bacteriostatic or a bactericidal effect or both on *B. coli* was tested. . . . It was found that 0·0001 gm. potassium tellurite when injected intravenously into rabbits immediately after infection was enough to save 50 per cent. of the animals. . . . It had little effect on *Past. bovisepticus* infection." *W. F. H.*

[The tellurites are intensely poisonous, KRAMER (*Bull. of Hyg.*, 1942, Vol. 17, p. 199) records a case of a laboratory worker who accidentally swallowed about 1 cc. of a 1 per cent. solution and was seriously ill for a long time, with diarrhoea, blood changes and osteitis of the jaw. Other cases have been reported and it is noted that at one time tellurium was used in the treatment of syphilis, with good effect, but had to be abandoned.—*Ed.*]

PASRICHA (C. L.), LAHIRI (M. N.) & DEMONTE (A. J. H.). **A Further Type of Choleraphage—Type N.**—*Indian Med. Gaz.* 1941. Apr. Vol. 76. No. 4. pp. 218–219.

Types A to M choleraphage have so far been isolated. BRUCE WHITE, however, obtained a strain from type L differing from the original type and he named it LL. It was found that egg-white lysozyme greatly enhanced the activity of this phage. The use of lysozyme enabled White to show that 15 Indian strains of *Vibrio cholerae* examined by him were infected with LL phage, whereas 10 Chinese and Japanese strains of *V. cholerae* proved free of LL phage and were sensitive to its action. The present authors have purified a set of A to M choleraphages from contaminating phage by propagation and " plaque isolation " on a Japanese Inaba strain of *V. cholerae* which was known to be free from any contaminating LL phage. With the application of a " reciprocal cross test " it was found that the LL phage behaved as a new type. It must, therefore, be called N choleraphage. A very important character of the new phage is that it acts on *V. cholerae* alone and not on the inagglutinable vibrios. In this respect it resembles type A and is distinguished from types B to M. *W. F. H.*

PASRICHA (C. L.) & PAUL (B. M.). **Bacteriophages in Soil.**—*Indian Med. Gaz.* 1941. July. Vol. 76. No. 7. p. 416.

This is a brief note to record the many samples of garden and field soil containing bacteriophages against the dysentery bacilli, *Bact. typhosum* and *V. cholerae* in that order of frequency. The phages were found in soil taken at levels down to three feet below the surface.

C. W.

BANERJEE (D. N.). **Hypochloraemia in Cholera.**—*Indian Med. Gaz.* 1941. June. Vol. 76. No. 6. pp. 345–349. [18 refs.]

The excessive vomiting and diarrhoea of cholera both lead to great loss of chlorides. In a series of cases in which measurements were

made it was found that a loss of 9·7 gm. chloride in 24 hours occurred through vomiting and of 34·6 gm. by the bowel. These cases were receiving at the same time a fair quantity, about 25 gm., of chloride daily by intravenous and subcutaneous injection. The result is a marked hypochloraemia with "a great alteration in the distribution of electrolytes and in the acid-base balance." Both haemoconcentration and hypochloraemia are found in cholera, but it is the hypochloraemia which is of more importance in the production of azotaemia than the concentration. The chlorides in the body fluids play a great part in the stabilization of the acid-base balance. It is to be expected, therefore, that this balance would be, as it is, greatly altered in cholera. If loss of chlorides remains unrestricted the invariable result is "dehydration, retention of nitrogenous waste products and renal failure." *W. F. H.*

BANERJEE (D. N.). **Capillary Reaction in the Cholera Kidney.**—*Jl. Indian Med. Assoc.* 1941. Aug. Vol. 10. No. 11. pp. 443–446. With 4 figs. [13 refs.]

Dehydration and loss of body fluid in cholera produce a fall of systemic blood pressure which has a marked effect on renal function by lowering the pressure in the glomerular capillaries. With this lowering of glomerular pressure there is slow filtration through the glomerulus, which allows increased reabsorption in the tubules and further diminution in the quantity of urine. The chief kidney lesion noted in cholera is congestion and this is explained by the author as due to dilatation of interlobular arteries extending to afferent and efferent vessels and the capillaries of the glomerulus itself with consequent stagnation of the circulation. "The renal vascular failure in cholera is only a part of the whole systemic peripheral capillary failure. The arterial system is found to be empty while the venous system, particularly of the splanchnic area, is engorged. This leaves the capillary system stagnant . . . . This capillary failure in the kidney in conjunction with great loss of interstitial fluid and hypochloraemia constitute the mechanism of the renal failure in cholera." *W. F. H.*

TOMB (J. Walker). **Cholera and Uraemia.**—*Jl. Trop. Med. & Hyg.* 1941. July 1. Vol. 44. No. 13. pp. 80–82. [14 refs.]

Due consideration is given in this article to the varying views of writers on the subject of uraemia, anuria in cholera and collapse. The author's own view is that intravenous saline injections may fail to "restore and maintain the circulation in cholera as well as to re-establish the secretion of urine after collapse has existed for two or more hours," because the renal capillary endothelium and tubular epithelium have been irreparably damaged by lack of oxygen. This leads to the suggestion that collapse of the circulation, however caused, being due to tissue asphyxiation should be treated by administration of oxygen "after preliminary restoration of the circulation by intravenous salines or by salines with plasma." *W. F. H.*

ASHWORTH (Charles T.) & ADAMS (George). **Blood Specific Gravity Studies. Relationship of Specific Gravity of Whole Blood to Specific Gravity of Plasma, Red Blood Cell Count, Hematocrit, and Hemoglobin as Indicators of Hemoconcentration.**—*Jl. Lab. & Clin. Med.* 1941. Sept. Vol. 26. No. 12. pp. 1934–1939. With 3 figs.

More than one of the tests applied in blood examination are indicators of blood concentration. Some of these are more easily put into execution than others. Some overlap in their indications without being exactly identical. The authors use the specific gravity, especially of the whole blood, as their indicator of haemoconcentration. They have worked out, experimentally, the linear relations between specific gravity of whole blood and haematocrit erythrocyte volume, haemoglobin (gm. /100 cc.) content and number of erythrocytes. The method of determining specific gravity was that known as " the falling drop method " (BARBOUR & HAMILTON, *Jl. Biol. Chem.*, 1926, Vol. 69, p. 625). Haemoglobin was estimated by means of a photo-electric colorimeter and haematocrit volume with Wintrobe graduated tubes. In the connecting equations the average specific gravity of human erythrocytes is taken as constant at 1·0971, the actual variation in normal individuals being from 1·0936 to 1·0998. " In patients with anaemia the variation was somewhat greater, from 1·0868 to 1·1045." The specific gravity of erythrocytes was calculated from the equation :—

$$\text{S.G.r.b.c.} = \frac{(\text{S.G. whole blood} \times 100) - \text{S.G. plasma} \times (100 - \text{haematocrit})}{\text{haematocrit volume}}$$

With the average specific gravity of human erythrocytes known, the haematocrit value may be calculated from the specific gravity of whole blood and plasma, being equal to S.G. whole blood × 100 − [S.G. plasma × (100 − haematocrit)]/1·0971.

Although the specific gravity of the whole blood is partly dependent on the S.G. of the plasma it has been found in practice that " the hematocrit, red blood cell count and hemoglobin bear a distinct mathematical relationship to and can be fairly accurately estimated from the specific gravity of the whole blood." The relationships may be expressed as follows :—

(1) Haematocrit = (S.G. whole blood − 1·0457) × 1000 + 32
(2) Haemoglobin = (S.G. whole blood − 1·0470) × 386 + 11
(3) R.b.c. count in millions = (S.G. whole blood − 1·0466) × 14·5 + 3·5

In shock, protein concentration or specific gravity of plasma was not found to be a satisfactory indicator of haemoconcentration, since protein is lost from the circulating blood during the course of shock.

W. F. H.

DEMONTE (A. J. H.) & GUPTA (S. K.). **Erythrocyte Sedimentation Rate in Cholera.**—*Indian Med. Gaz.* 1941. Apr. Vol. 76. No. 4. pp. 213–216.

Cholera is an acute disease and is regarded by some as an allergic manifestation, by others as a toxic manifestation. It was thought that the sedimentation rate might throw some light on the truth of one or other of these hypotheses. Altogether 79 cholera patients were examined. The results showed that acceleration and total fall were greater than normal in 53 of these cases. One factor of importance in

cholera is the increased specific gravity of the blood due to dehydration which itself slows the sedimentation rate and may be a reason why acceleration is not more evident in this disease. *W. F. H.*

RUSSELL (H.). **Suppression of Urine in Crush Oedema.** [Correspondence.]—*Lancet.* 1941. July 19. p. 87.

In this letter the author likens the condition in crush oedema to that which occurs in cholera, in which there is suppression of urine when the patient collapses because of the huge effusion of fluid from the circulation into the intestine. This suppression is associated with acidosis, and the work of SELLARDS in treatment with large intravenous doses of sodium bicarbonate is recalled. In cholera the secretion of urine may be restarted even after suppression lasting for two days. Calcium should be included in the solution and an excess of sodium avoided, but alkali must not be given after the urine has become alkaline. *C. W.*

ALDRIDGE (A. G. V.). **A Comparison of the Value of Crystalloid Solutions, Whole Blood and Blood Plasma in the Treatment of Dehydration in Infancy.**—*Arch. Dis. in Childhood.* 1941. Sept. Vol. 16. No. 87. pp. 182–205. With 9 figs. [28 refs.]

Treatment of dehydration from whatever cause produced, whether from pyloric stenosis and gastroenteritis in children or cholera in the tropics should proceed on much the same lines. Three factors come into play : (1) loss of water, (2) loss of electrolytes with alteration of the acid-base balance of the blood, and (3) the effect which oliguria may play in producing the condition. Treatment takes account of these factors (1) by giving fluid in excess of normal requirements (at least 2½ oz. per pound of body weight per day), and (2) parenteral administration of fluid to supplement insufficiency of oral intake, by subcutaneous and intravenous routes. The fluids used are normal salt solution and 5 to 10 per cent. glucose in sterile triply-distilled water or in normal salt solution. Moderate dehydration may be dealt with parenterally by the use of normal saline subcutaneously as continuous drip, at 10 to 15 cc. per pound of body weight. If dehydration is severe a 5 to 10 per cent. glucose in saline is given intravenously either in simple doses of from 10 to 15 cc. per pound of body weight or by continuous drip for 24 to 72 hours. The question also naturally arises of the benefit of transfusion of blood in these cases. The matter is not altogether simple, for the state of concentration of the blood in erythrocytes and in salts has to be taken into consideration whether transfusion is to be of whole blood or of plasma only. These questions are discussed in clear detail in the text.

The chief aim in treatment is the replacement of water and salts lost by diarrhoea and vomiting. It is unnecessary to provide specially for loss of bicarbonate because it is the replacement of the sodium ion which is really required. "When simple sodium chloride is administered for dehydration the body is able to keep the ion of which it is most in need and, provided that renal function is active, can excrete the other in the urine." Oliguria, and still more anuria, must be relieved, and for this purpose the fluid used must not only supply water to the organism but restore the disordered blood chemistry by its diuretic action. For this purpose hypertonic glucose (10 per cent.) is most commonly used. There are some objections, however, to the haphazard use of intravenous glucose. Its diuretic effect may result in

removal of too much chloride with production of tetany, or too much water with production of increased dehydration. Then too there are the objections that with the use of a large volume of fluid intravenously the plasma protein may fall considerably and oedema of the intestinal mucosa may lead to increase of the diarrhoea. The principles governing the treatment of dehydration, including those relating to transfusion of blood, are sufficiently summarized in the conclusion :—" Solutions of normal saline should not be used as routine treatment . . . . ; in many instances there is an apparent, if not actual, accumulation of chloride in the blood which may increase if further chloride is administered. The routine use of whole blood . . . is not recommended, as in the majority of cases the blood, which is already concentrated, becomes even more so as the result of treatment. When considering the use of blood transfusion the haematocrit, and preferably the red cell count and haemoglobin concentration in addition, should be estimated. If these are raised above normal the case is unsuitable for transfusion. In those patients in whom the haematocrit shows a marked degree of haemo-concentration and who require more drastic treatment than the administration of crystalloid solutions parenterally, transfusions of plasma should be undertaken." *W. F. H.*

PASRICHA (C. L.), MALIK (K. S.) & PAUL (B. M.). **The Sterility and Potency of Injectable Substances. (ii) Salines for Intravenous Use.** —*Indian Med. Gaz.* 1941. Apr. Vol. 76. No. 4. pp. 216–218.

In recent years evidence has accumulated to show that febrile reactions after intravenous injections of saline solutions are due to pyrogenic substances, usually dissolved in the saline used. These are largely split proteins derived from bacteria, commonly present in the air, which gain access to, and readily multiply in, solutions which are not kept rigidly sterile. Pyrogenic substances may, moreover, pass over with droplets from water, in the act of distillation, to the distillate, unless the still is provided with arrangements to prevent this.

It is important to avoid water containing pyrogenic substances in the treatment of cholera, since there are indications that febrile reactions may counteract the beneficial effects of saline therapy. The authors give in outline certain methods of ensuring pyrogen-free distilled water. They tested 12 samples of salines intended for intravenous use, and stored in bottles, some corked, some with glass stoppers and some with screw caps. In each specimen bacteria were present, chiefly cocci and spore-forming organisms, and in each was found oxidizable matter in comparatively large quantity. It is evident that the storage methods employed were ineffective to prevent contamination, but the best is apparently storage in screw-capped bottles. It is pointed out that oxidizable matter may be derived from sterile cotton wool used either as a plug or as a filter. The authors advise that salines for intravenous use should be prepared, at a central source of supply, by persons skilled in the necessary technique. *C. W.*

PASRICHA (C. L.), ABEDIN (Z.) & PAUL (B. M.). **The Sterility and Potency of Injectable Substances. (iii) Cholera Vaccines.**—*Indian Med. Gaz.* 1941. June. Vol. 76. No. 6. pp. 344–345.

The authors have examined 200 samples of cholera vaccine. Of these, 34 per cent. failed to pass sterility tests, 51 per cent. were unsatisfactory by the direct agglutination test, and only 37 per cent. passed

both the sterility and potency tests. Although all were claimed to contain 8,000 million organisms per cc., only 24 per cent. corresponded to the Brown's opacity tubes indicating that strength or more. In spite of the known fact that autolysis may occur, it is difficult to believe that those samples containing only 2,185 million or less ever contained the stated 8,000 million.

To overcome the difficulty of autolysis the authors desiccated and sealed a thick suspension of *V. cholerae*; they find that resuspension in saline is satisfactory and that there is no appreciable loss of opacity during storage. Moreover, the antigens appear to be better preserved in the dry state than in suspension. Desiccation is simple and offers great advantages in storage and transport. *C. W.*

ERRATUM.

Vol. 38, No. 4, p. 212, line 15, *for* "Prepare peptone-agar of composition :—peptone 40 gm., sod. chloride 80 gm., water 4,000 cc. . . ." *read* "Prepare peptone-agar of composition :—peptone 40 gm., sod. chloride 20 gm., agar 80 gm., water 4,000 cc. . . ."

LEISHMANIASIS.

McCLELLAND (Henry W. H.). **Notes on an Endemic Centre of Kala-Azar in the Province of Hupeh, Central China.**—*Chinese Med. Jl.* 1941. July. Vol. 60. No. 1. pp. 87–89.

The author gives a brief account of 15 cases of kala azar, seven of them diagnosed by the discovery of leishmania, which came under his notice in Anlu, which is situated 70 miles north-west of Hankow, in the province of Hupeh. There is no doubt, from enquiries made, that the disease has existed for some time in the district, where it is evidently endemic. The cases actually seen came from villages and hamlets at varying distances from Anlu. *C. M. Wenyon.*

SENEKJI (H. A.) & ZEBOUNI (Nasrat). **Biochemical Reactions of the Genus Leishmania.**—*Amer. Jl. Hyg.* 1941. Sept. Vol. 34. No. 2. Sect. C. pp. 67–70.

The biochemical reactions of a number of strains of leishmania were studied from the point of view of growth on various sugar media, thermal death point, bile solubility, etc. It is claimed that *L. brasiliensis* [the parasite associated with American muco-cutaneous leishmaniasis] is so resistant to bile that 30 per cent. of the leptomonads are still alive after seven days, whereas *L. infantum* and *L. caninum* are immediately dissolved. There was no evidence of sugar fermentation by the leishmania nor was there any production of indole. The thermal death point was 15–20 minutes at 40°C. and immediate at 45°C. All the forms tested are aerobic or facultatively aerobic. Such are some details of the result of the study described in this paper.

C. M. W.

CHUNG (Huei-Lan) & LU (J. P.). **Cross Complement Fixation Reaction of the Sera of Kala-Azar Patients and the Sera of Dogs and Rabbits Infected with or Immunized against** *Leishmania donovani* **and** *Leishmania canis.*—*Chinese Med. Jl.* 1941. Apr. Vol. 59. No. 4. pp. 301–313. [13 refs.]

With antigens prepared from the spleens or livers of moles and hamsters experimentally infected with *Leishmania donovani* and *L. canis*, complement fixation tests were carried out with the sera from cases of human and canine kala azar in Peiping and with the sera of rabbits injected intravenously with parasites from the spleens of hamsters. From the tests carried out it was clear that the complement fixation test was of definite value for the diagnosis of kala azar and that the parasites used in the experiments were either identical with, or very closely related to one another. This would mean that the human and canine kala azar of N. China are caused by the same parasite.

C. M. W.

IRR (M. G.). **Generalized Leishmaniasis in Dogs. Clinical Observations on the Formol-Gel Reaction in Diagnosis and Prognosis.**—*Algérie Méd.* 1938. May. [Abst. from German version in *Berl. Münch. Tierärztl. Woch.* pp. 677–681. Note by translator (W. WITTMER) p. 681.] [Summary taken from *Vet. Bull.* 1941. Dec. Vol. 11. No. 12. p. 850. Signed U. F. RICHARDSON.]

Observations are recorded on the relationship of the formol-gel reaction to the severity of the attack in canine leishmaniasis, and on the effect of treatment on the reaction. The dogs on which the observations were made could be divided into two groups, the first of which was characterized by a slow gelification of the serum, such animals improving under treatment. In the second group gelification occurred within a few minutes, the animals showed more or less severe symptoms of disease, and failed to respond to treatment.

Treatment consisted in the injection of "stibyal," which in the early work was given at a total dose of 84 cg. in three series of six injections spread over a period of two months. This treatment was not always tolerated, and later it was reduced to doses of 18–30 cg. in three series of six injections separated from each other by 1–2 weeks. In cases belonging to the first group, treatment resulted in retardation of gelification, and finally in its disappearance. If the test failed to become negative under treatment, relapses might be expected. In the second group of animals, treatment failed to affect the rapidity of gelification, and the animals usually died.

It is concluded that when gelification is delayed a favourable prognosis can be given, but delay cannot be accepted as indicating freedom from infection, and rapidity in gelification may indicate intense parasitism. If gelification occurs in the absence of disease symptoms, the effect of treatment may help in the confirmation of the diagnosis. Animals which recover under treatment are not immune to experimental reinfection, but after one or two attacks they appear to acquire sufficient immunity to protect them in an infected environment.

In his note, the translator describes his treatment of a dog affected with leishmaniasis, which was brought to Hamburg from Algeria,

As "stibyal" was not available, W. used neosalvarsan and "neostrontiuran," but with no effect. Antimosan solution was then tried, and was found to be well tolerated and reasonably effective, with the advantage that it need not be given intravenously.

CHUNG (Hui-Lan) & FENG (Lan-Chou). **Further Observations on Natural Infection of *Phlebotomus chinensis* in Peiping with Leishmania.**—*Chinese Med. Jl.* 1941. June. Vol. 59. No. 6. pp. 540–542.

Of 57 female sandflies (*Phlebotomus chinensis*) captured in a kennel in which a dog suffering from kala azar was kept in a private house in Peiping, 34, or about 60 per cent., were found to be naturally infected with flagellates indistinguishable from *Leishmania donovani*. The flies had been collected between June 10th and July 6th, 1940. In one of the infected flies there was a heavy infection extending from the proboscis to the midgut. A normal Chinese hamster inoculated subcutaneously with the flagellates from two of the flies contracted visceral leishmaniasis. *C. M. W.*

YAO (Y. T.) & WU (C. C.). **Notes on the Chinese Species of Genus *Phlebotomus*. Part IV. Diagnostic Tables for the Chinese Species of Sandflies with Some Remarks on their Geographical Distribution.**—*Chinese Med. Jl.* 1941. July. Vol. 60. No. 1. pp. 73–78. With 5 plates.

HO (E. A.), CHU (H. J.) & YUAN (I. C.). **A Report of Two Cases of Canine Leishmaniasis with Reference to the Development of Skin Lesions.**—*Chinese Med. Jl.* 1941. July. Vol. 60. No. 1. pp. 84–86. With 2 plates.

Owing to the fact that in canine kala azar leishmania are frequently more numerous in the skin than in the internal organs, while various skin lesions commonly occur, the view has been expressed by some that in kala azar it is the skin, and not the organs, that is primarily infected. In this connexion the history is given of two dogs that were found to be suffering from kala azar by the discovery of leishmania in the bone marrow. These dogs had normal skins in which parasites could not be discovered. During the course of the next six months the dogs showed signs of illness, while skin lesions began to appear. The globulin test, previously negative, became positive and parasites began to appear in the skin. Experience with other dogs has shown that whenever parasites are present in the skin they are demonstrable in the organs. It is concluded that the skin infection is secondary to infection of the organs. *C. M. W.*

TORRES (C. Magarinos). Sobre as alterações da pele do cão no kala azar sul-americano. [**Changes in Skin of the Dog in S. American Kala Azar.**]—*Rev. Brasileira Biol.* Rio de Janeiro. 1941. Apr. Vol. 1. No. 1. pp. 81–82.

The author has studied the skin of dogs suffering from infections due to human and canine strains of leishmania of kala azar in S. America. The first change to occur is the accumulation of histiocytes along the blood vessels of the skin. These cells contain few parasites in the early stages of the infection; later, however,

the parasites are numerous. The histiocytes may accumulate into veritable nodules which show a tendency to fibroblastic change and retrogression. Associated with these changes there develops a vesico-pustular dermatitis and occasionally actual ulceration of the skin—the result of a suppurative folliculitis and perifolliculitis. The lymphatics of the skin contain cells infected with leishmania and these cells in the intercellular spaces of the skin and in the superficial lymphatic plexus afford an opportunity of infection of the intermediate host.

In one dog a swelling of the feet, similar to the condition described in infected hamsters, was observed. This was caused by oedema and infiltration by histiocytes and other cells. *C. M. W.*

JIMÉNEZ DÍAZ (C.) & CASTRO MENDOZA (H.). Alteraciones de la lipidemia observados en el kala-azar. [**Alterations of Lipoidaemia in Kala Azar.**]—*Rev. Clin. Espanola.* 1941. Apr. 1. Vol. 2. No. 4. pp. 357–359. French summary.

In eleven cases of kala azar the authors have studied the lipoid and cholesterol content of the blood. In all but two of these, in which the lipoid content was 610 and 620 mgm. per cent. respectively, the figure obtained was below the normal, which is between 480 and 700. In the case of the total cholesterol content in the above two cases alone was a figure above the normal of 150 to 180 mgm. per cent. obtained. In the others it was considerably below normal. The ratio of free cholesterol to cholesterol esters, however, is above normal, indicating a diminished esterification of free cholesterol which is paralleled only by that which obtains in the severest hepatic insufficiency. It cannot be concluded that the paucity of esters is due to a suppression of the enzymatic esterification as a result of the action of substances elaborated by the leishmania. The flocculation phenomena characteristic of serum of kala azar cases is probably the result of the diminished amount of cholesterol esters. *C. M. W.*

ARANTES (Sebastião C.). A intradermo-reação de Montenegro na lepra. [**Montenegro Intracutaneous Reaction in Leprosy.**]—*Folha Med.* 1941. Mar. 25. Vol. 22. No. 6. pp. 63–66. With 5 figs.

The reaction of Montenegro in leishmaniasis consists in the allergic response of the skin to intracutaneous inoculation of an antigen consisting of a phenolized saline suspension of culture forms of the parasite. The reaction has been found to be so specific that it is useful as an aid to diagnosis. Nevertheless, in certain cases of glandular tuberculosis a positive result was obtained. In the present paper an account is given of tests carried out with the leishmania antigen in 142 cases of leprosy of different types. In none of the cases was a positive reaction observed unless there was a history or other evidence of a previous leishmania infection. The leprosy infection did not modify the reaction in cases which had recovered from cutaneous leishmaniasis. In one case of leprosy in which a nasal lesion was present a positive reaction was obtained. Examination of scrapings from the nose led to the discovery of leishmania. Cases of leprosy which had recovered from their leishmania infection twenty years before still gave a positive Montenegro reaction. *C. M. W.*

NAPIER (L. Everard), KIRWAN (E. O'G.) & SEN (G.). **Eye Complications of Dermal Leishmaniasis.**—*Indian Med. Gaz.* 1941. Sept. Vol. 76. No. 9. pp. 542–543. With 5 figs. (1 coloured) on 2 plates.

An Indian, 20 years of age, who gave a history of recovery without treatment from some febrile disease which may have been kala azar, presented himself for treatment for typical post-kala-azar dermal leishmaniasis which began to develop five years before. Nodules and depigmented areas occurred all over the face and body and from these leishmania were recovered. The case differed from others of the kind in that the cornea in each eye was involved in the process, giving rise to a leishmanial keratitis of a nodular type in one eye which obstructed vision almost entirely. Though in Bengal the cutaneous condition develops in about 5 per cent. of persons who have suffered from kala azar, this appears to be the first case on record in which involvement of the cornea has occurred. The fact that in this case there was no history of treatment for kala azar was not surprising, for 25 per cent. of the cases of this type of dermal leishmaniasis from Bengal give no history of such treatment. Vigorous treatment with potassium iodide and organic antimony compounds (neostibosan, ureastibamine, aminostiburea) was followed by resolution of the skin and ocular lesions, so that a considerable degree of vision was restored. The paper is illustrated with photographs of the face and a coloured plate of the eye lesions, which differ from the abscess type of involvement which may occur as a complication of oriental sore due to *Leishmania tropica.* *C. M. W.*

SOONG (H. Y.) & ANDERSON (Hamilton H.). **The Evaluation of Drugs in Experimental Leishmaniasis.**—*Amer. Jl. Trop. Med.* 1941. May. Vol. 21. No. 3. pp. 461–467. [14 refs.]

The authors describe a method for the evaluation of drugs to be used in the treatment of kala azar, in which groups of experimentally infected hamsters are used. The treated and control groups should consist of 30 animals each. If reliable data are to be obtained, drugs of known composition alone should be tested. Thus, ureastibamine, the antimony content of which varies between 20 and 43 per cent. is not a satisfactory drug to test. The dose employed for a single injection is one-tenth of the L_{50} dose (the dose which leads to the death of 50 per cent. of animals injected). The drug was administered in aqueous solution subcutaneously three times a week and was continued till a total quantity equal to the L_{100} or universal lethal dose had been given. For neostibosan this was 4 gm. per kilo. of body weight and for ureastibamine 3 gm. The animals were kept under observation for four months, after which the survivors were examined. In the experiment with the two drugs mentioned all the treated animals were free from infection, while all but one of the controls showed parasites in the spleen. From the data available it was not possible to form any opinion in favour of the one or the other drug. In addition to the direct action on the parasite of any drug a number of observations, such as the acute and chronic toxicity, tissue changes resulting from treatment, rate of elimination of the drug, untoward reactions, have to be taken into account. It is clear from the paper under

review that there is no rapid method for determining the value of any drug—which can only be arrived at by careful pharmacological technique. *C. M. W.*

ADAMS (A. R. D.). **Studies in Chemotherapy. XXVI. A Case of Indian Kala-Azar treated with 4 : 4′-Diamidino Diphenoxy Pentane.**—*Ann. Trop. Med. & Parasit.* 1941. Oct. 21. Vol. 35. No. 1. pp. 53–54.

The author describes the treatment of a case of kala azar in an Indian sea cook 35 years of age, from Calcutta. The drug was given by daily intravenous injection of 2 mgm. per kilo. of bodyweight. The treatment lasted eight days. On the fifth day the temperature began to fall and there followed a rapid general improvement—increase in body weight, shrinkage of the spleen, improvement in the blood picture. When the patient left hospital unexpectedly eighteen days after commencement of treatment he appeared to be well on the way to complete recovery. It was noted during treatment that after intravenous injection of the drug the patient became very quiet and languid, while the pulse was rapid and thready. Observation on the blood pressure showed that within a minute of an injection this fell from 106/70 mm. to a systolic pressure of 50 mm. There was a return to normal in 10 minutes. Following a dose of 100 mgm. given intramuscularly a similar depression occurred followed by a slower return to normal. On no occasion was there loss of consciousness and the patient did not appear to be unduly distressed by the rapid fall in his blood pressure. *C. M. W.*

WINGFIELD (A. L.). **4 : 4′-Diamidino Stilbene in the Treatment of Kala-Azar.**—*Ann. Trop. Med. & Parasit.* 1941. Oct. 21. Vol. 35. No. 1. pp. 55–58. With 1 chart.

The case reported is that of an Indian cook, 25 years of age. He had been treated with neostam, three injections of which (0·1, 0·1, and 0·15 gm.) had been given in four days. Two days later intense irritation of the skin with oedema of the upper eyelids and upper part of the face was reported. There was no visible rash. Twelve days later the patient was admitted to hospital. Intradermal injection of 0·02 gm. of neostam was not followed by any reaction, nor was an intravenous injection of 0·1 gm. given next day. As a supply of diamidino-stilbene was available treatment with this drug was commenced. Ten daily intravenous injections of 45 mgm. were given. The early injections caused vomiting and all produced weakness and faintness and some breathlessness and headache. It was found that the unpleasant reaction could be avoided by injecting the drug slowly. After one of the early injections there was a marked fall in blood pressure. The temperature did not reach normal till three days after the completion of the course. A second course of 10 injections of 50 mgm. was followed by complete clinical cure. During the course of treatment blood sugar estimations showed that this fell parallel to the fall in blood pressure and it is suggested that the drug may exert an effect antagonistic to that of adrenalin. *C. M. W.*

ADLER (S.) & TCHERNOMORETZ (I.). **Notes on the Action of 4 : 4′-Diamidino Stilbene on *Leishmania donovani* and *Leishmania infantum* in the Syrian Hamster *Cricetus auratus*.**—*Ann. Trop. Med. & Parasit.* 1941. Oct. 21. Vol. 35. No. 1. pp. 9–14.

The paper describes experiments carried out by the authors on the treatment of Syrian hamsters experimentally infected with *Leishmania donovani* or *L. infantum*. The animals were infected by intraperitoneal injection of cultures or, in the case of some of the experiments with *L. donovani*, by direct inoculation of leishmania into the spleen—a method which leads to a rapid development of a heavy infection. The drug, administered by injection daily or on alternate days in doses varying from 1 to 40 mgm. per kilo. of body weight, was found to have a definite therapeutic action on both infections, but those due to *L. infantum* were more resistant than those due to *L. donovani*. This corresponds with clinical experience, which indicates that cases of Mediterranean kala azar due to *L. infantum* require at least three times as much ureastibamine or neostibosan to bring about a cure as do cases of Indian kala azar due to *L. donovani*. *C. M. W.*

BRITISH MEDICAL JOURNAL. 1941. Nov. 29. pp. 774–775.—**Chemotherapy of Protozoal Infections.**

SHAH (M. H.). **Report on the Epidemic of Oriental Sore in Delhi.**—*Indian Med. Gaz.* 1941. Aug. Vol. 76. No. 8. pp. 449–457. With 23 figs. on 2 plates. [11 refs.]

Though isolated cases of oriental sore occur nearly every year in Delhi an outbreak such as the one described in this paper is unprecedented. It was first noted in the Ramajas High School which with another educational institution occupied a rocky ridge—the Kala Pahar—near Sarai Rohilla. Inspection of the 750 boys in these institutions showed that a large number were suffering from oriental sore. At the end of 1939 a survey of the entire population of the ridge revealed widespread infection. In addition to diagnosis by the discovery of leishmania in the sores a skin test was carried out on the boys of the school by the intracutaneous injection of "leishmin," presumably an antigen prepared from cultures of the parasite. The result was read in 48 hours. Of 76 boys suffering from the disease 75 gave a positive reading, while of 206 with no evident signs of oriental sore 140 were positive. The outbreak was so serious that dispensaries for treating those infected had to be established. Up to the end of 1940, 4,215 cases had been treated, while it was estimated that a total of nearly 20,000 cases must have occurred in Delhi during this period. A few dogs were encountered, and two of these were found to have sores on the head. Leishmania were recovered from the sores on one dog. Sandflies—*Phlebotomus sergenti*—were prevalent in the district and examinations carried out by Dr. R. O. A. SMITH showed that these were liable to infection with flagellates regarded as developmental forms of *Leishmania tropica*. As regards their general distribution on the body and their characters, the sores corresponded with the many forms described by those who have studied the disease in other localities. There was considerable variation in severity. One labourer was found to have 239 active sores and scars of many healed ones. Various methods of treatment were employed. Scraping, followed by dressing with tannic

acid powder or magnesium sulphate paste, has been found to be the treatment of choice. Tartar emetic ointment (4 per cent.) has given good results, considered to be due to its necrogenic effect. Injection of trivalent or pentavalent antimony compounds has been found to be the only specific for the disease. Experience of this epidemic appears to indicate that no single line of treatment can be expected to cure all cases ; each case must be treated individually according to the progress made. The paper, which is illustrated with two pages of photographs, is a valuable one which will repay careful study. *C. M. W.*

SENEKJI (H. A.). **On the Polysaccharide of** *Leishmania tropica.*—*Amer. Jl. Hyg.* 1941. Sept. Vol. 34. No. 2. Sect. C. pp. 63–66.

The author has applied to the culture form of *Leishmania tropica* methods which have been employed for chemical fractionation of bacterial antigens. He has shown that the leptomonads have a flagellar antigen which gives large-flaking loosely-knit clumps and a somatic antigen giving small-flaking tightly-knit clumps. The fractionation reveals an S fraction which is polysaccharide and thermostable, and an H fraction. When these fractions are tested by intracutaneous injections it is found that non-immune individuals are not allergic to S or H fractions or to whole leptomonads. On the other hand, patients suffering from oriental sore are allergic to both fractions and to both killed and living leptomonads. The skin reaction appears in 15 to 30 minutes, reaches a maximum in 24 hours and fades gradually away in four to five days. In individuals who have recovered from oriental sore the allergic reaction with the S fraction is not constant. On the other hand the whole leptomonads give rise to a definite reaction.

C. M. W.

ADLER (S.) & BER (M.). **Transmission of** *Leishmania tropica* **by the Bite of** *Phlebotomus papatasii.* [Correspondence.]—*Nature.* 1941. Aug. 23. Vol. 148. No. 3747. p. 227.

This is a preliminary note to the effect that female *P. papatasi* fed through a membrane on a suspension of flagellates in three parts 2·7 per cent. saline and one part inactivated defibrinated rabbit blood produced 28 lesions of cutaneous leishmaniasis in five of eight human volunteers. The sandflies were kept at a temperature of 30°C.

C. W.

REY-MATIZ (Hernando). Observaciones sobre leishmania. [**Studies on Leishmania.**]—*Rev. Facultad de Med.* Bogota. 1941. July. Vol. 10. No. 1. pp. 52–54. With 3 figs.

The following is a translation of the author's conclusions :—

Cutaneous leishmaniasis is widespread in Colombia.

1. Material from ulcers of human leishmaniasis was injected into dogs, with positive results.

2. Similar attempts were negative when *Dasyprocta variegata* [the agouti] was used as the test animal.

3. Studies on cultivation, immunological reactions, vectors and mode of transmission are necessary for the specific classification of leishmania in Colombia. *C. W.*

Do Amaral (A. D. Franco). Observações sôbre a resistência das culturas de "Leishmania brasiliensis" a várias temperaturas. [**Resistance of *L. brasiliensis* Cultures to Various Temperatures.**]—*Arquivos do Inst. Biol.* Buenos Aires. 1940. Vol. 11. pp. 5–9. English summary.

The author has tested the action of cold on cultures of *Leishmania brasiliensis*. Continuous or interrupted exposure to a temperature of 5°C. to 10°C. for 50 days caused cultures which had been grown for four days at the usual culture temperatures to lose vitality. Nevertheless, subcultures from the exposed cultures grew well. Similarly, if cultures which are being maintained at 23°C. are exposed daily to a temperature of −9°C. for a sufficient time to freeze the culture—daily freezing and thawing—there is, after a week of such treatment, evidence of loss of vitality which, however, is restored by keeping the cultures continuously at 23°C. for 12 days. The same effect is noted if the cultures are kept continuously at −9°C. for 15 days. Continuous freezing for more than 15 days kills the cultures. Cultures kept at −9°C. to 9°C. did not flourish; at 12°C. to 13·5°C. there was scanty growth; at 14°C. to 16°C. growth was abundant, while it was exuberant at 20°C. to 28°C. Growth fell off at 30°C. and was *nil* at 33°C.

C. M. W.

Pessôa (Samuel B.) & Coutinho (J. O.). Pesquiza de *Leptomonas* em dipteros hematofagos de uma localidade com alta incidencia de leishmaniose tegumentar. [**Search for Leptomonads in Blood-Sucking Diptera in a Locality where the Incidence of Cutaneous Leishmaniasis is High.**]—*Folha Med.* 1941. Sept. 5. Vol. 22. No. 17. pp. 199–200.

In an earlier publication the authors reported the results of their examination of species of *Phlebotomus* for naturally occurring leptomonas infections in a part of Brazil where the incidence of cutaneous leishmaniasis is high. In the present paper they give the results of the examination for similar infections of a number of other biting insects. In no case was a leptomonas infection encountered. In species of *Phlebotomus* (*P. migonei*, *P. whitmani*, *P. pessoai*) of which 6,920 were dissected, an incidence of natural leptomonas infection of 0·23 per cent. was obtained.

C. M. W.

Pessôa (Samuel B.). Profilaxia da leishmaniose tegumentar no Estado de São Paulo. [**Prophylaxis of Cutaneous Leishmaniasis in São Paulo.**]—*Folha Med.* 1941. July 25. Vol. 22. No. 14. pp. 157–161. With 1 map.

Writing of cutaneous leishmaniasis in the State of São Paulo, Brazil, the author discusses possible methods of prevention. He dismisses action against sandflies (species of *Phlebotomus*) owing to lack of precise knowledge of the actual vectors or their habits. The suggestion that leptomonads of latex-producing plants may have some connexion with the leishmaniasia is without foundation. Dogs, which have sometimes been shown to suffer from cutaneous leishmaniasis, might act as reservoirs of the virus, but in the district investigated it was not possible to obtain evidence that dogs were infected. It seemed evident that human beings alone are carriers of the leishmania

in this locality. It has been noted that recovered persons are immune to any further attack, so that artificial production of immunity might be regarded as a prophylactic measure if this could be carried out. Accordingly a vaccine consisting of the culture forms of eleven strains of *Leishmania brasiliensis* grown on N.N.N. medium was prepared and injected on three occasions at weekly intervals into 527 persons who were previously shown to be non-immune by the Montenegro skin test. Of these persons 17 subsequently developed cutaneous leishmaniasis but five of these did so in less than a month after vaccination, a period which is too short for the development of satisfactory immunity. Of 444 vaccinated individuals who were followed up 12, or 2·7 per cent., developed the disease after one month from the time of vaccination. Of 683 unvaccinated non-immune individuals 108, or 15·6 per cent., contracted the disease in the same time. It would thus appear that vaccination confers an appreciable degree of protection.

Treatment, if successfully carried out, reduces the risk of infection to others but there is no single infallible remedy. In the first place tartar emetic for adults and fouadin for children are advocated. If these fail, alternating treatment with tartar emetic and eparseno or arsenite of soda may be tried, while finally, for cases resisting these drugs, anthiomalin, iodo-bismuthate, quinine, diathermy, application of lactic acid or injections of atebrin in the tissues around the lesions may be tried. *C. M. W.*

MALARIA.

MINISTRY OF SHIPPING. **Malaria among Merchant Seamen.** Notice No. M.178. 11 pp. London. 1940. Jan.

This pamphlet has been prepared for the use of masters of ships and of non-medical members of the crews. In it are described methods of preventing mosquito bites, especially in relation to the mosquito proofing of ships, quinine prophylaxis, the symptoms of attacks and the methods to be employed in treatment. It is clearly written and should be in the hands of all ships' masters—it might also be read with advantage by employers ashore. *C. W.*

MINISTRY OF SHIPPING. **Malaria among Merchant Seamen. Memorandum for the Use of Ships' Surgeons.** Notice No. M.195. 18 pp. With 6 charts. London. 1941. Feb.

This pamphlet is written for the use of ships' surgeons and contains a succinct but useful account of the clinical features of the disease and of methods of treatment. No attempt is made to give instruction on the staining or recognition of parasites, or on the entomology of malaria, nor would such matters be suitable for the type of pamphlet aimed at. In treatment, no mention is made of the administration of alkalis when quinine is given. There are brief notes on prevention of mosquito bites and on drug prophylaxis. The subject is important in view of the considerable number of cases of malaria reported in ships' crews since the beginning of the war. *C. W.*

ROBERTSON (R. Cecil) & CHANG (T. L.). **Malaria Survey in Western Yunnan, Lungling Area and Lushih County.**—*Chinese Med. Jl.* 1940. Oct. Vol. 58. No. 4. pp. 446–455. With 1 map.

See ROBERTSON, this *Bulletin*, 1941, Vol. 38, p. 501.

CLARK (R. H. P.) & CHOUDHURY (M. A.). **Observations on *Anopheles leucosphyrus* in the Digboi Area, Upper Assam.**—*Jl. Malaria Inst. of India.* 1941. June. Vol. 4. No. 1. pp. 103–107. With 3 figs. on 2 plates.

A. leucosphyrus is a serious vector of malaria among human beings living close to jungle.

The observations were made in and about the oil wells at Digboi, Assam, an area in which *A. minimus*, previously the most important carrier, is well under control. There is now very little malaria in the employees, but such people as woodcutters who live on the edge of jungle still suffer intensely. In these areas *A. leucosphyrus* breeds in small collections of stagnant water. It is fairly often found in houses, and the sporozoite rate was 2·4 in 859 dissected.

[The paper may have much more than local importance. Though *A. leucosphyrus* was previously known as a carrier, both in Assam and in the Dutch East Indies, it is often dismissed as a "jungle species," not often seen unless searched for. Evidently it may have considerable importance in forested areas, and as it has a wide distribution in India, and eastwards through Burma and the Malay Peninsula to the Philippines and Celebes, the matter is of military interest.]

P. A. Buxton.

GENEVRAY (J.) & TRY (H. T.). Etude malariologique de la région Tong Sontay. [**Malaria Survey of the Tong Sontay Region.**]—*Rev. Méd. Française d'Extrême-Orient.* 1940. Nov.–Dec. No. 9–10. pp. 566–573. With 1 folding map.

This is a report of a malaria survey carried out in the Tong area, which lies to the south of the Red River just to the east of the low foot-hills of Mount Bavi. There is an aerodrome there and in 1939 it was proposed to create an important industrial centre in the neighbourhood, hence the survey. Malaria appears to be only moderately endemic in most of the area surveyed. The anopheline fauna is rich, but the most important vectors of Indo-China, though present, have a very limited distribution. The following species of *Anopheles* were found: *sinensis*, *vagus*, *philippinensis* (the three most prevalent species), *barbirostris*, *tesselatus*, *kochi*, *fuliginosus*, *karwari*, *aconitus*, *minimus* and *jeyporiensis*. Of the dangerous species *A. aconitus* was most widespread. *A. minimus* was found in only two villages in the south of the area surveyed.

Norman White.

PATTANAYAK (G. C.). **Malignant Malaria simulating Other Diseases.**—*Jl. Indian Med. Assoc.* 1940. Dec. Vol. 10. No. 3. pp. 123–124.

Brief clinical notes are given of four cases of malaria in which the symptoms simulated those of other pathological conditions. One patient was admitted into a cholera ward of a hospital as a case of cholera during an epidemic of that disease. Another was diagnosed

as acute bacillary dysentery. The other two had symptoms of intestinal obstruction; one of them narrowly escaped operation. All four patients responded to anti-malaria treatment and recovered. *N. W.*

VRYONIS (George). **Blood Studies in Malaria. The Genesis of Blood Cells in Relation to Treatment with Quinine.**—*Amer. Jl. Med. Sci.* 1940. Dec. Vol. 200. No. 6. pp. 809–819. With 8 charts. [20 refs.]

This paper presents the data obtained from counts of the reticulocytes, erythrocytes and leucocytes made during the treatment of four patients suffering from subtertian malaria. The patients were children, all members of the same family, who were in hospital together; one of them was in a state of coma on admission. They were undernourished and anaemic. Daily blood examinations were made and the results are recorded on instructive graphs. A reticulocytosis followed the regression of fever and the disappearance of asexual parasites from the blood, when numerous gametocytes appeared. On the third day after treatment began the reticulocytes ranged from 4,000 to 100,000 per cmm. The peak of the reticulocyte curve was reached about the 11th day after the start of treatment, and their numbers remained between 400,000 and 800,000 for the next seven to nine days. Thereafter their number began to fall abruptly. The erythrocytes, microcytic at the time of admission, decreased in numbers until about the 11th day of treatment. The total red cell count remained low, at about 2,500,000, all the time the reticulocytes were abundant. After the reticulocyte count began to decrease, about the 19th day, the red cell counts progressively increased, and normal sized erythrocytes began to appear. The leucocytes ranged from 7,000 to 16,000 per cmm. till about the 11th day, when the reticulocyte count was highest and the red cell count lowest; then the leucocytes began to decrease, largely at the expense of the neutrophiles, and continued to decrease throughout the period of reticulocytosis. When the reticulocytes began to decrease a progressive increase of leucocytes began, accompanied by a marked eosinophilia. The lymphocytes, basophiles and large mononuclear cells were unaffected. The temporary granulopenia was probably a genetic phenomenon; this is indicated by its relationship to changes in the reticulocytes and to the total red cells, and by the development of eosinophilia at its termination. *N. W.*

BISPHAM (W. N.). **Toxic Reactions following the Use of Atabrine in Malaria.**—*Amer. Jl. Trop. Med.* 1941. May. Vol. 21. No. 3. pp. 455–459. [14 refs.]

When atebrin was first used there were many alarming reports as to its toxicity; in many quarters physicians are said to be still doubtful of its safety. The author has made a study of all reported reactions in 49,681 cases in which atebrin was administered, of which 7,915 were under his personal supervision. The nature of the commonly reported toxic symptoms is discussed. The slowness of the elimination of the drug is an important factor in producing toxic reactions. The author thinks that the bowels should be freely opened and kept open by saline cathartics if necessary, and that liquids should be freely taken during the administration of the drug. The conclusion is reached

that the toxicity of atebrin is of small importance, and though it should always be considered it should not deter physicians from the use of the drug. *N. W.*

DALÉAS (P.). Traitement du paludisme grave par le quinobleu. [**Treatment of Severe Malaria with "Quinobleu."**]—*Rev. Méd. Française d'Extrême-Orient.* 1940. Feb. No. 2. pp. 96–101.

Quinobleu contains chlorohydrate of quinine 15 cgm.; arrhenal 2 cgm.; methylene blue 2 cgm.; normal saline 5 cc. It is put up in ampoules and is given intravenously two or three times a day. The author claims to have a long and wide experience of the treatment of malaria in Indo-China, as the result of which he has reached the conclusion that quinobleu is at present without rival as a safe and effective remedy in the treatment of grave cases of malaria. Necessitating as it does repeated intravenous injections the treatment is only suitable for hospital cases. It also has the disadvantage of producing a bluish discoloration of the skin. For these reasons the treatment should be reserved for grave cases; in such cases remarkable improvement in the patients' condition follows the first injection. *N. W.*

LIU (Shao-kwang), CHANG (Yao-teh), CH'UAN (Tz'e-kwang) & TAN (Shih-chieh). **The New Antimalarial Drug Sinine. A Preliminary Report.**—*Chinese Med. Jl.* 1941. June. Vol. 59. No. 6. pp. 575–577.

Sinine is an alkaloid obtained from the root bark of *Fraxinus malacophylla*; it differs from quinine in many physical and chemical properties, but possesses antipyretic action in induced fever in rabbits, and immobilizes infusoria. Powdered root bark was tried in the treatment of malaria in 34 cases, the dose being 3 gm. of dried powder thrice daily after meals for adults, correspondingly lessened for children. Within 8 days parasites (of all three species) had disappeared from the blood, and splenic enlargement was reduced. Stem bark and leaves are also effective. In some children vomiting or tinnitus was produced if large doses were given. There were no recurrences of malaria.

It is concluded that this drug is as satisfactory as quinine and that, in view of the fact that the tree is common in Yunnan, its economic value is greater. *C. W.*

FIELD (J. W.), NIVEN (J. C.) & MITCHELL (J. F.). **Field Observations on the Use of M3 for the Prevention of Malaria.**—*Bull. Inst. Med. Res. Federated Malay States.* 1940. No. 5. 9 pp. With 4 figs.

The Italian Biochemical Institute of Milan has issued a drug which is known as M3 and is claimed to be very successful in the treatment and prevention of malaria. It contains mercury to increase phagocytosis, manganese to foster haemopoiesis, and extract of spleen to stimulate the reticulo-endothelial system and develop immunity. A course of treatment of 72 tablets over a month, it is claimed, will build an effective immunity which will last for about a year in temperate zones and for six months in the tropics. Previous records of the use of M3 have been noticed in this *Bulletin* [1938, Vol. 35, p. 31; 1940, Vol. 37, pp. 503, 746; see also 1939, Vol. 36, p. 262].

For testing a supply which was sent by the manufacturers' agents 300 Tamils recently arrived on a malarious plantation were selected

and divided into three groups of a hundred. Group I had the full course of M3; Group II a weekly dose of one gramme of quinine sulphate; Group III, unprotected for control.

Protocols are presented and the figures analysed. There is no need to detail these. The numbers were small, and the amount of quinine hardly sufficient for protection. Two months after the prophylactic attempts were started the plantation was swept by an outbreak of subtertian malaria—a good test of the new drug. The upshot of the experiment was that the drug did not produce any significant difference in the parasite rate; incidence was high in all groups, and only in the second group was there any evidence of reduction; M3 did not modify either the incidence or the severity. Lastly, there were no signs of any effective immunity even after the complete course suggested by the makers. [The list of references contains several errors: CABRAL's article was published in July 1937, not 1939; CHOPRA and BROWN should be CHOPRA and BASU, and the publication in which their paper appeared is the *Jl. Malaria Institute of India,* not *Survey*; FATTOVICH and LENTI's article was published in *Arch. Ital. Sci. Med. Colon. e Parassit.* 1938, not 1939.] *H. H. S.*

MENU (P.) & TOUMANOFF (C.). Le choix d'emplacement des campements et les indisponibilités pour le paludisme dans les effectifs militaires en campagne. [**Selection of Camping Sites and Malaria Invalidity among Troops on Service.**]—*Rev. Méd. Française d'Extrême-Orient.* 1940. Oct. No. 8. pp. 519–528. With 4 plans & 1 graph.

This paper emphasizes the importance of the careful selection of camping sites for troops in country in which there is hyperendemic malaria, and illustrates some of the factors to be considered in such selection by the experience of four small detachments of troops which were engaged on road construction where the frontiers of Annam, Cochin China and Cambodia meet. Here *A. minimus* is the most dangerous vector, and the danger of clearing bush or other shade from the vicinity of water courses is stressed. The experience of the four detachments shows that it is possible to safeguard the health of troops in a hyperendemic area if the site of camps can be determined by the results of previous topographical and entomological surveys. *N. W.*

VISWANATHAN (D. K.). **Experimental Malaria Control in a Hyperendemic Tea Garden in Upper Assam by the Use of Pyrocide 20 as an Insecticidal Spray.**—*Jl. Malaria Inst. of India.* 1941. June. Vol. 4. No. 1. pp. 35–55. With 1 map & 8 graphs.

This experiment in malaria control was carried out in a tea garden in the Lakhimpur District of Upper Assam in which malaria is hyperendemic, though hospital figures indicate a diminishing prevalence of clinical malaria during the past five years. *A. minimus* is the vector. Commencing in April 1940, 244 coolie houses out of a total of 599 were sprayed regularly once a week with Pyrocide 20, 1 part, kerosene, 19 parts. The unsprayed houses were used as a control. The sprayed and unsprayed quarters were equally near the breeding grounds of *A. minimus.* The houses were constructed of sun-dried brick, mud-plastered, with metal roofs with thatch extensions: their complete

closure was not attempted. During the nine months in which spraying was carried out the incidence of clinical malaria in the garden as a whole was appreciably lower than the expected incidence, even allowing for a continuation of the downward trend of morbidity referred to above, but there was no significant difference in the malaria morbidity of the inhabitants of sprayed and unsprayed houses respectively, as indicated by hospital attendances. The infant malaria index, however, fell 40 per cent. during this period in the sprayed houses, while it rose 95 per cent. in the unsprayed houses. The spleen rates of children aged 2 to 10 in the two groups were almost identical, about 80 per cent. There was a definite decline in the parasite rates of both children and adults in the sprayed group of houses; in the unsprayed houses there was no such decline. Anopheline infestation of sprayed houses was only very slightly lower than that of the unsprayed houses, but of 421 *A. minimus* captured in sprayed houses only two were infected, whereas 13 infected *A. minimus* were found among 705 captured in unsprayed houses.

N. W.

KNIPE (Fred W.). **The Use of Solidified Carbon Dioxide in Developing Pressure for Spray-Killing Adult Mosquitoes in Malaria Control.**—*Amer. Jl. Trop. Med.* 1941. Sept. Vol. 21. No. 5. pp. 671–679. With 2 sketches & 2 figs.

This paper describes the construction and adjustment of equipment in which solidified carbon dioxide is used to generate gas pressure to operate a spray-gun for killing adult mosquitoes. Most good paint spray-guns give good atomization, when properly adjusted, but most methods of producing the necessary gas pressure at present in common use have their disadvantages. If solidified carbon dioxide can be obtained at reasonable cost (which was not the case in South India), it is considered by the author to be the ideal source of pressure. It gives adequate pressure without auxiliary equipment, it is easy to operate, and carbon dioxide mixed with atomized kerosene vapour, the usual diluent of the insecticide, diminishes the risk of fire.

The apparatus designed by the author is simple to construct. Details of its construction are clearly described and illustrated. A safety blow-off valve is of course essential.

A cake of solidified carbon dioxide, six inches cube, lasted about four hours, during which time an average of 45 Indian houses were sprayed.

N. W.

KENNEDY (J. S.). **Lethal Concentration and Mode of Action of Copper Sulphate used as a Mosquito Larvicide.**—*Jl. Econom. Entom.* 1941. Vol. 34. No. 1. pp. 86–89. [Summarized in *Rev. Applied Entom.* Ser. B. 1941. Nov. Vol. 29. Pt. 11. pp. 174–175.]

"Tests of copper sulphate as a mosquito larvicide were carried out on the northern German and Portuguese strains of *Anopheles maculipennis*, Mg., var. *atroparvus*, van Thiel, using the technique described by Bates. The media were distilled water and Medium S. Most larvae survived for three days in the presence of 1 part anhydrous copper sulphate in 50,000, but very few could reach the second instar unless the dilution was as much as 1 part in 500,000. The average survival rates were much higher in Medium S than in distilled water, but the results with the latter were very erratic. It was shown that copper sulphate at 1 : 50,000 can poison the larvae directly, apart from

its effect on the microfauna. At lower concentrations, destruction of the food supply may influence survival. Copper carbonate was precipitated when copper sulphate at 1 : 10,000 was added to tap water and to water from a ditch in Albania in which *A. maculipennis typicus* abounds in summer. In experiments in which larvae of *A. m. atroparvus* of the Hamburg strain were kept in dishes of the ditch water with the addition of copper sulphate at 1 : 10,000, 1 : 50,000 and 1 : 100,000, all died, whereas in the water without copper sulphate, 82 per cent. survived, and in Medium S with the addition of copper sulphate at 1 : 100,000, about 80 per cent. survived. The increased kill is probably due to the ingestion of copper in larger quantities when it is present in the solid form."

FIELD (J. W.), NIVEN (J. C.) & MITCHELL (J. F.). **Field Observations on the Effect of Prophylactic Plasmoquine on the Incidence, Course and Severity of** *Falciparum* **Malaria.**—*Bull. Inst. Med. Res. Federated Malay States.* 1940. No. 4. 8 pp. With 4 figs.

The observations here recorded were carried out on an isolated plantation in Selangor. There was intense malaria with uncontrolled breeding of *A. umbrosus* and *A. novumbrosus*. Most of the malaria was due to *P. vivax*, but *P. falciparum* infections were fairly common. For a period of one year 0·02 gm. of plasmoquine was given twice a week to each of 96 per cent. of the population, which averaged 645. A group of infants born on the plantation received no plasmoquine; they provided clinical data of transmission. Attacks of malaria were treated with quinine for one week. There was considerable residual *falciparum* malaria when the plasmoquine medication started and a certain amount brought in by newcomers or contracted somewhere and somehow during the course of the observations. The transmission of *P. falciparum* appears to have been very low during plasmoquine administration; gametocytes were found only six times in 2,000 routine blood examinations, and only one *falciparum* infection was detected in the blood of 20 infants born during the course of the experiment and examined every week. Altogether there were 231 attacks of *falciparum* malaria among people undergoing plasmoquine prophylaxis: most were probably recurrences of old infection, but not all. Moreover, prophylactic plasmoquine does not appear to have modified the severity of attacks of *falciparum* malaria as measured by intensity of parasite infestation of the blood. It is concluded that "in areas where fresh transmission of *falciparum* is slight and infections are mostly residual or contracted elsewhere, the prophylactic administration of plasmoquine at a dosage of 0·02 gramme twice a week may not markedly affect either the general course or the incidence and severity of clinical attacks."

N.W.

HELMINTHIASIS.

SAUNDERS (G. M.). **A Comparison of the Incidence of Filariasis** (*Wuchereria bancrofti*) **in the Islands of St. Thomas and St. Croix.**—*Amer. Jl. Trop. Med.* 1941. May. Vol. 21. No. 3. pp. 481–485.

Though these two islands lie only about 40 miles from one another, though there is frequent intercommunication, and though *Culex fatigans* is common in both, filariasis is very common on St. Croix, very rare on St. Thomas. What is the reason?

The data for St. Croix are 200 consecutive admissions to the Municipal Hospital, Christiansted, examined by KNOTT in 1939. In St. Thomas are 195 persons chosen at random and examined by Saunders; the former used 20 cmm. of night blood, the latter 1 cc. of day blood, Knott having shown [this *Bulletin*, 1940, Vol. 37, p. 304] that the two methods give comparable results. Saunders's examinations disclosed microfilariae in the blood of one person only, a negress aged 42 (who had visited Porto Rico and St. Croix), she had no clinical signs; but he found suspicious physical signs in two others, elephantiasis of the left leg in one and a brawny swelling of the same part in the other. Microfilariae were present in 25 per cent. of those recorded in St. Croix, and physical signs in about 12 per cent. As a possible reason for this difference it is pointed out that the population of St. Croix is essentially rural and agricultural, in St. Thomas urban and non-agricultural.

"It is certain that there are one or more factors in St. Thomas which tend to interfere with the natural life cycle of the filaria. A complete understanding of these factors might lead to simple methods of control in St. Croix." *Clayton Lane.*

YOSINO (Takayosi) & NAKASATO (Tyotei). **On the Distribution and the Degree of Infection of Wuchereria Bancrofti in Yaeyama Islands, Okinawa Prefecture.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1941. Apr. Vol. 40. No. 4. [In Japanese pp. 749–760. [19 refs.] English summary p. 761.]

The authors have examined the night blood of 5,086 persons in the Yaeyama islands to the east of Formosa. The percentages positive range from 6·17 in Iriomote to 29·29 in Hateruma. In the age group 1–5 years the percentage is 3·45 and this rises to 23·54 at age 21–30 and 24·26 at ages above 60. The youngest person found infected was aged 18 months and from this it is deduced that the time necessary for development of the worm and production of microfilariae is about one year. The degree of infection, measured by the examination of 0·1 cc. of night blood was :—60·24 per cent. light, 35·35 medium and 4·41 heavy, except in Hateruma where medium infections are the most common. *C. W.*

OHAMA (Sinken). **Investigation on the Incidence of Wuchereria Bancrofti among the Primary School Children of Sirara in Yaeyama District, Okinawa Prefecture.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1941. June. Vol. 40. No. 6. [In Japanese pp. 1164–1168. English summary p. 1168.]

Night blood was examined from 416 children and *Mf. bancrofti* was found in 24·04 per cent. There were very few heavy infections, but the degree of infestation was found to increase with age. *C. W.*

OHAMA (Sinken). **On the Examination of Microfilaria Bancrofti in Day Blood.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1941. May. Vol. 40. No. 5. [In Japanese pp. 941–944. English summary p. 945.]

"The author made an examination of 32 carriers (3 [? 4] heavy, 6 moderate, 19 light, 3 lightest) of microfilaria Bancrofti among children

and employees in the Taketomi elementary school on day blood after the method performed by James Knott at 9 to 10 o'clock in the morning. When the amount of day blood was the same as that of night blood (20 cmm.), only 1 (3·13 per cent.) was positive, while with 50 times (1 cc.) as much as the amount of night blood, among 32 carriers 22 (68·75 per cent.) were positive, of which the heavy and moderate were both 100 per cent., the light 57–89 per cent. and the lightest 33·33 per cent., and with 250 times (5 cc.), 10 (100 per cent.) were positive among 10 carriers examined."

BONNE (C.), LIE KIAN JOE, MOLENKAMP (W. J. J.) & MREYEN (F. W.). *Wuchereria malayi*, de macrofilaria behoorende bij de microfilaria malayi. [*W. malayi*, **the Adult of** *Mf. malayi*.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. July 15. Vol. 81. No. 28. pp. 1487–1501. With 6 figs. on 2 plates. English summary. [13 refs.]

"Description of male and female of *Wuchereria malayi* found in a Malay patient (♂) who suffered from spleno-medullary leucemia and who died from urosepsis after an operation for calculus vesicae.

"On dissection under the binocular microscope of a number of scarcely enlarged inguinal glands with their surrounding tissues to which one enlarged popliteal gland was added, one complete male, one complete immature female and a number of parts of mature females were discovered.

"The patient did not show symptoms of filariasis. His blood contained numerous microfilariae malayi. Bancrofti microfilariae were absent. The larvae in the uterus in the fragments of mature females were typical malayi larvae. The larvae from the uterus of a bancrofti female, which was available for comparison, showed typical bancrofti structures. This seems to exclude the possibility of microfilaria malayi and bancrofti being different stages of larval evolution of the same filarial species. The male was present in the same cluster of inguinal glands which contained fragments of mature females.

"The structures of the adult worms correspond in general with the description of *Wuchereria malayi* given for the first time by SUNDAR RAO and MAPLESTONE.

"Length of the male 2·6 cm., diameter 90μ. Length of the complete immature female 4 cm., diameter 120μ. Diameter of fragments of mature females 170μ.

"The bulbous head shows two rows of very minute papillae. The apex of the tail is rounded. The tail of the male shows about 2½ spiral turns.

"The vulva is situated 900μ from the anterior end in the mature worms. The distance between anal orifice and apex of the tail in a mature female was 280μ. Distance between the male cloacal orifice and the apex of the tail 150μ.

"Cuticula of the tail of the male with fine transverse striations becoming narrower near the tip (5μ–2μ apart). No cuticular striations in other parts of male or female.

"Long spicule of the male surrounded basally by a sheath with oblique opening and spiral strengthening of its wall. An extremely delicate flimsy membrane follows the free part of the spicule for over half its length. This may be an artefact, however. Tip of the spicule not much flattened or widened. Length of the long spicule 360μ of which 180μ comes for the free part.

"Short spicule stout, not clearly visible, probably built up by two parts, a sturdy basal part and a less chitinized terminal part situated in or alongside the wall of the above mentioned sheath, both parts about 60μ long. A short, boat or crescent shaped gubernaculum with unequal arms, strongly chitinized and easily visible.

"Base of the spicular apparatus with distinct transverse corrugations.

"Four thick papillae not easily to be made out on the left side of the cloaca in a fold. On the right side No. 4 of these papillae is underdeveloped and practically absent. Probably two tiny postanal submedian papillae on each side, one very near the tip of the tail and one about halfway.

"There seems to be no doubt that the worms in question were the adults of microfilaria malayi. They closely resemble *Wuchereria bancrofti*. The transverse corrugations of the spicular apparatus, a feature present in *W. bancrofti* but not visible in the males of malayi described by SUNDAR RAO and MAPLESTONE, are present in our male specimen. The main difference between the adults of malayi and bancrofti seems to be the number and shape of the cloacal papillae and folds as indicated already by SUNDAR RAO and MAPLESTONE. In view of the still existing uncertainties about these structures we feel that we are not in a position to give conclusive evidence on this point before more material is collected and available for study."

HU (S. M. K.). **Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with** *Microfilaria malayi* **Brug. IV.** *Culex vorax* **Edwards.**—*Peking Nat. Hist. Bull.* 1941. Vol. 15. Pt. 3. pp. 215–216. [Summarized in *Rev. Applied Entom.* Ser. B. 1941. Sept. Vol. 29. Pt. 9. p. 140.]

"An account is given of an experiment, similar to others already noticed, that was carried out in 1939 in Shanghai to test the susceptibility to infection with *Filaria* (*Microfilaria*) *malayi* of females of *Culex vorax*, Edw., reared from larvae collected locally. Of 18 adults that engorged on a case with a heavy infection, 3 out of 11 dissected 19 days later and 1 out of 7 dissected 23 days later each contained one infective filarial larva. The other 14 mosquitos were negative. None of the infective larvae showed any sign of chitinisation, but the fact that only one larva was found in each infected mosquito indicates that it is improbable that this species plays a significant part in the transmission of the parasite under natural conditions in the Shanghai region, where, moreover, the adults are seldom seen in inhabited houses."

KOBAYASI (Hidekazu). **On the Development of** *Microfilaria bancrofti* **in the Body of the Mosquito** (*Culex fatigans*).—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1941. May. Vol. 40. No. 5. [In Japanese pp. 891–910. With 1 chart. [27 refs.] English summary pp. 911–912. With 14 figs. on 2 plates.]

RAO (S. Sundar) & SUKHATME (P. V.). **Seasonal Variations in the Incidence of Filarial Lymphangitis.**—*Indian Jl. Med. Res.* 1941. Jan. Vol. 29. No. 1. pp. 209–223. With 11 graphs.

"Statistical analysis of the variation in monthly admissions of patients, new and old, at the Filariasis Clinic of the Calcutta School of Tropical Medicine, during the period from 1929–1938, is carried out

with the object of defining precisely the nature of the periodical movement recurring year after year in the incidence of filarial lymphangitis. The analysis showed that the monthly incidence during the monsoon period from July to September when the humidity is high and the temperature optimum is 40 per cent. higher than in the winter period from October to February. The period from March to June showed an incidence slightly higher than the average giving an appearance of a prelude to the monsoon period of the highest incidence."

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION. 1941. May. Vol. 10. No. 8. pp. 331–336. With 9 figs. on 2 plates. [14 refs.]—**A Symposium on Surgical Complications of Filariasis** [RAY (P. N.), Opener; RAMANAMURTI (M. V.)]. [Discussion pp. 336–341 [MENON (T. Bhaskara); RAMAMURTI (B.); MAHADEVAN (R.); RAO (W. V. S. Kameswara)].

The delivery of these papers covered two days of the Proceedings of the Scientific Section of the XVII All India Medical Congress, 1940, held at Vizagapatam under the Presidency of B. Tirumal RAO.

P. N. RAY, in opening the session, held filarial infestation to be due to a specific infection or lesion of the lymphatic endothelium due to the presence or passage of parasites, adult or young, and to their toxins which cause definite cellular reaction in lymphatic vessels and surrounding tissues, particularly in the lymphatic glands. The enlargement of these last is due to formation of eosinophil granulation, particularly near the vulval end of the worm, and it is such inflammatory reaction and not mechanical obstruction by adult parasites that causes lymphatic obstruction, compensatory lymphatic circulation being quickly established. The effects of diurnal parturition of the adult female parasite, imprisoned in an obstructed lymph vessel, may be conjectured but are not so easily demonstrated. What effect the myriads of microfilariae, alive or disintegrated, will have on the endothelium deserves further careful investigation. No doubt is felt that the inflammatory attacks are not due to streptococcal infection but to the adult parasites, though in a large number of cases there is superadded pyogenic infection. Sulphanilamide has been effective even when no secondary streptococcal infection is present, the action not appearing to be specific and parasiticidal. For recurrent attacks induced pyrexia by benign tertian malaria is advised, though it is not yet known how high and how long the fever should be to destroy the parasites. Antigens from hydrocele have been used therapeutically. There is no specific drug. For lymph scrotum no operation should be undertaken while there is leakage. Chyluria is a feature in areas of low endemicity, and in about two-thirds of the cases the leakage of chyle is from the mucosa of the bladder. For management the foot of the bed should be raised and fat should be avoided in the diet [but see MAHADEVAN below]. Lymph varix of the spermatic cord may be treated by injection into it of 10 per cent. sodium morrhuate solution. For elephantiasis of the limbs there is advised either a modified Auchincloss operation, or a gluteo-plastic one, large flaps from the two areas being transposed [see KNOTT, this *Bulletin*, 1939, Vol. 36, p. 152].

M. V. RAMANAMURTI, in his address as seconder, stated that though inflammatory attacks may possibly be due to filarial toxins, staphylococci and in a few instances streptococci were isolated from abscesses.

The treatment advised was sulphanilamide and vaccine. He deprecated the induction of fever by malaria, and considered injection of T.A.B. vaccine to be preferable. Since using sulphanilamide and filarial vaccine before operation he had had no septic complications after scrotal amputation. Skin grafting of the penis is unsatisfactory, for there is no loose tissue under the graft and it does not stretch ; but if the preputial skin remains unaffected the loose tissue under it does allow normal function, yet healing always leaves a circular ulcer at the base. He noted that with a lymphuria there might be in the urine as much blood as lymph, and he had seen steady lymphorrhagia from the urethra three years after an operation for scrotal elephantiasis.

T. Bhaskara MENON in opening the discussion noted that round living parasites there may be no reaction, but that when reaction occurred it might be either an acute eosinophil inflammation with oedema (regarded as allergic and explaining filarial fever, elephantoid fever and lymphangitis) or a filarial granuloma with formation of a pseudotubercle due to absorption of a dead worm or present round a calcified one. The passage in the human body of the infective larva from the mosquito is held to be by the lymph only, since it is difficult to explain how something 1800μ long and 25μ to 30μ broad can pass the capillary plexus of the lung.* His experiments in lizard and man tend to show that it is the lymph escalator which is probably used, that larvae deposited on the skin round the bite die, and that only those deposited deep in the puncture can go through the tissues.

B. RAMAMURTI believed that the infective larvae followed the lymphatic route and that the whole of the pathology and symptomatology of the disease was due to the worm itself—to its excretions when alive and to its disintegrating products when dead. There was no specific treatment, but strict prophylaxis, preventing further doses of infective larvae, gave good results.

R. MAHADEVAN, remarking that filarial infection was by no means rare in childhood, showed elephantiasis of the penis of two years' standing of a boy of 13, urged that minute and frequent traumata occur from walking barefoot on an elephantoid leg, and suggested that when there is elephantiasis without a history of fever it is because the fever has been forgotten. Frank haematuria may bring patients for treatment ; so may intermittent haematospermia such as came on in a young man six months after removal of an elephantoid scrotum. Fat should not be excluded from the diet of a chyluric patient for he is losing much of what he should have retained. An early elephantoid penile skin is better than any skin graft, yet it may later ulcerate. Acute streptococcal funiculitis may mimic strangulated hernia and needs incision, and filarial orchitis may mimic malignant disease ; lymph scrotum may pass on into an elephantoid condition† and chylous hydrocele may be the only filarial sign.

W. V. S. KAMESWARA stressed that the infection may be symptomless and may account for 15 per cent. of hospital admissions in endemic areas, believed that infective larvae entered the skin through the mosquito puncture, noted the constancy of the height of the nightly

* Looss wrote of the infective hookworm larvae with their thickness of 24μ that they " are not seldom found in the pulmonary veins (photo 31, Pl. XIX)." Anatomy and Life History of *Agchylostoma duodenale*, Part II, p. 361 (1911).

† " I have operated on over 100 cases of elephantiasis of the scrotum, large and small, and the early history of many of these was that of lymph scrotum." The Filaria Sanguinis hominis (1883) p. 101 ; Patrick Manson.

microfilarial blood tide, pointed out that when the filaria is delivering her young every day numbers are being killed in some mysterious organ, and discussed drug treatment.

RAY in his summing up noted the speakers' agreement that the adult worm was the root cause of the pathological change in the host.

C. L.

RAY (P. N.). **Surgical Complications of Filariasis.**—*Indian Med. Gaz.* 1941. Apr. Vol. 76. No. 4. pp. 194–199. With 7 figs. on 1 plate. [11 refs.]

See abstract of his paper in the symposium on surgical complications of filariasis which covers the same general ground. *C. L.*

WOODMAN (H. M.) & BOKHARI (Ahmed). **Studies on *Loa Loa* and the First Report of *Wuchereria bancrofti* in the Sudan.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941. Sept. 9. Vol. 35. No. 2. pp. 77–92. [23 refs.]

The occurrence of *W. bancrofti* is for the first time reported in the southern part of the Anglo-Egyptian Sudan, where 15 per cent. of the population shows infection by *Mf. loa* and where the probable percentage is 20, if " hidden " cases are taken into account. This latter infection is believed to be the essential local cause of commonly recognized filarial symptoms.

After examining more than 1,500 blood films taken by day and by night, *Mf. bancrofti* was discovered in this area in 1937, and during that year and the next some dozen cases came to light. These microfilariae had the typical morphological appearance and were confirmed as such by Professor LEIPER. Three cases of the non-periodic form were discovered, the remainder showing nocturnal periodicity ; more often than not there was Loa infection as well ; in no case of elephantiasis, lymphatic varix, varicose groin glands, or hydrocele was either the adult or the microfilaria found [? locally], nor was acute lymphangitis of the filarial type or elephantoid fever seen.

Of British and Syrian officials 23 per cent. were known to be infected with *Loa loa*. There has been no opportunity of dissecting *Chrysops silacea*, but specimens have been preserved for sectioning. Of 600 wild *C. distinctipennis* dissected, four were found infected. With difficulty were specimens of this species induced to feed on infected volunteers, and when they did, development of the embryos was slower than was noted in *C. silacea* and *C. dimidiata* by CONNAL and CONNAL [this *Bulletin*, 1922, Vol. 19, p. 654] ; infectivity was seemingly reached on the 12th to the 16th day, the developmental rate was irregular. Insects lived as long as that only if they had been induced to take food once or twice more, and none with mature embryos would feed after the twelfth day. The larvae were concentrated almost exclusively in the abdomen up to the ninth day, later they collected in the head. No fly lived long enough for embryos ingested at a second meal to mature. No other vectors were traced. Variations from the typical structure of microfilariae are these :—

" The nuclei of the central column of cells were notably larger and more prominent in the first two rows of the cephalic end. The first row was often of three long nuclei roughly parallel but showing variation in their position in relation to one another, a lateral one usually being furthest forward. It was not uncommon to find one or more of these well forward, leaving very little of the typical clear space, that faintly stains without nuclei, of the classical descriptions.

"The dispositions, though often irregular and thus typical, were also quite often in neat circles.

"The tail tip was long, tapering and fairly frequently, but by no means always, typically flexed. The nuclei varied considerably in how far they extended into the tail in a single line. (There was never any disposal of two detached nuclei in a background faintly stained towards the tip, as in *Mf. malayi*).

"The sheath occasionally took up Geimsa's stain.

"Relative measurements from the Anterior V spot to the cephalic tip, and from the V spot to the tail spot, showed divergences from the classical text-book measurements.

"Comparison of 72 night slides with day bloods taken in the same cases showed that the microfilariae were not diurnal. In some they were present in equal numbers at all hours but usually fewer were seen at, say, 9 p.m. . . . . In only 9 per cent. of cases were the microfilariae absent entirely up to 12 p.m. Bloods that swarmed by day usually showed a clear reduction in numbers at night."

In the discussion on drug treatment it is concluded with HISSETTE that it is doubtful if any drug will be found to destroy microfilariae of any filarial species and to spare the host. An instance is given of a European in whom Calabar swellings appeared after four months' exposure, but no microfilariae had been seen during the next seven years; in him eosinophilia reached 73 per cent. Worms crossing the conjunctiva were easily killed by novocain, one in an eyelid becoming cretified. Hydrocele is the outstanding surgical condition with fluid nearly always clear, with chylous cloudiness only when there was scrotal elephantiasis, *Mf. volvulus* being found once in a smear from the wall of the tunica vaginalis and apparently no other microfilaria except occasional *Mf. loa*; haematocele was rare. Inguinal hernia was frequent though the tribe was robust, at operation it was common to find adult *L. loa* moving about, especially among the blood and lymphatic vessels of the cord, and three times one was found in the lymph varix which is common there [whether or not within a lymph vessel is not clear], but on no occasion were adults or larvae of *W. bancrofti* discovered there; moreover, the distribution of Loa seems to correspond to those African areas where hernia is commonest. Elephantiasis is not very common, and the only sites are the scrotum, vulva or leg. When enlarged lymph nodes were removed during hernia operations, there was on section slight endothelial proliferation in lymph vessels, microfilariae were found in 2 of 20 sections, but round them there was no fibroblastic or giant cell reaction in any way comparable with that described by Clayton LANE [this *Bulletin*, 1937, Vol. 34, p. 885] for *W. bancrofti*, the enlargement of the nodes being caused by simple chronic fibrosis; nodes from cases of elephantiasis were not examined; these lesions are believed to be caused by Loa. Avian filariasis was also investigated. *C. L.*

VARGAS (L.). Simulium lane-portoi n.n. (Simuliidae, Dipt. y lista de simúlidos mexicanos. [**Mexican Simuliidae.**]—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1941. June. Vol. 2. No. 1. pp. 115–122. [14 refs.] English summary (7 lines).

FAUST (Ernest Carroll), THOMAS (E. Perry) & JONES (Jack). **Discovery of Human Heartworm Infection in New Orleans.**—*Jl. Parasitology.* 1941. Apr. Vol. 27. No. 2. pp. 115–122. With 2 figs.

"Dissection of the body of an aged negress, a native and life-time resident of New Orleans, La., has resulted in the recovery of a single adult

male filaria from a blood clot in the inferior vena cava. The failure to find any females or microfilariae suggests that the male was the only worm that had developed. There was no evidence indicating that the heartworm infection had produced any pathology.

"The measurements of this heartworm, together with the character of the preanal and postanal papillae and the structure of the copulatory spicules, indicate that on morphological grounds the worm is specifically different from the common heartworm of dogs (*Dirofilaria immitis*), from *D. indica*, from *D. pongoi* and from *D. magalhãesi*, the only previously reported heartworms of mammals. Based on these criteria this worm is designated as *Dirofilaria louisianensis* n. sp."

This woman's body came under examination on the dissecting table, showing evidence of acute toxic nephritis and a pericaecal abscess. The other infection from man was discovered by MAGALHÃES (and was named after him by BLANCHARD); it consisted of a male and a female worm found in the left ventricle of a boy living in Rio de Janeiro. For parasites, each found once only in man, there must be reservoir hosts, but they are unknown. The new parasite is described in detail and pictured; it is 120 mm. long. A table shows certain diagnostic differences between the six known species of the genus.

C. L.

BROWN (H. W.) & SHELDON (A. J.). **Treatment of the Canine Heartworm** (*Dirofilaria immitis*) **with Fuadin and Sulfanilamide.**—*Jl. Amer. Vet. Med. Assoc.* 1941. June. Vol. 98. No. 771. pp. 477–481.

"A combined sulphanilamide and fuadin course of treatment continued for ten days is effective against the canine heartworm *Dirofilaria immitis*. Five of the dogs so treated were rendered free of microfilariae as judged by stained preparations of 0·1 cc. of peripheral blood. The sixth dog given the combined treatment had its microfilaria count reduced 96 per cent."

The sulphanilamide was given twice a day by mouth in pill form, 4 to 5 grains daily for each kilo. of body weight; the fouadin was injected intramuscularly, for four days 1 cc. and for six days 1·5 cc. daily into dogs weighing 11 to 15 kilos, the corresponding doses given to dogs of 20 kilos being 1·5 and 2 cc. All the five dogs that were made free of microfilariae were killed and examined on day 22; in three no worms were found, on the fourth there were six living males and 12 living females in the right ventricle, in the fifth there were twenty worms, some living, some disintegrating, in the right ventricle and pulmonary artery. Examination of several female worms from each group failed to reveal the presence of larvae. In the sixth dog, the one that still had microfilariae in the blood, no worms were discovered in the heart or pulmonary artery. As to this it is suggested either that circulating microfilariae may survive the death of their mother, or that the adults in the heart were missed, which is deemed not unlikely since there were few microfilariae in the blood, or that the adults were in some other part of the body.

C. L.

TIBIRIÇÁ (Paulo Q. T.). Granulomatose do apêndice por *T. trichiura*. [**Granuloma of the Appendix caused by** *T. trichiura*.]—*Ann. Paulist. Med. e Cirurg.* 1941. Feb. Vol. 41. No. 2. pp. 151–152. With 2 figs.

A boy of 14 had had for a year pain in the right iliac fossa, and nausea, vomiting and headache, for which his appendix was removed

Microscopic sections showed an infiltration of the mucosa and submucosa by eosinophils. The abundance of these last suggested further examination of certain nodules in the appendix, and in one of them there was found what was thought to be the disintegrating head of a whipworm. *C. L.*

CRAM (Eloise B.). **Studies on Oxyuriasis. IX. The Familial Nature of Pinworm Infestation.**—*Med. Annals.* 1941. Feb. Vol. 10. No. 2. pp. 39–48.

The Senior Zoologist, National Institute of Health, U.S. Public Health Service, points out the unique character of threadworm infection, and summarizes the features that make for its familial distribution.

There is the escape of the female worm from the anus before she starts oviposition, the immediate birth of some 11,000 eggs with her death, the development of the eggs to infectivity within 6 hours, their transport by air to objects that later come into contact with the hands and body of those in the house. The findings are then summarized in 1,525 members of 320 families examined by 5,539 NIH swabs. Of 286 white families only a quarter showed a single member infected, in 34 negro families more than half did so. In nearly half of the white families all the children examined showed the infection, in about half of them one or more adults also were infected. This frequent familial distribution is of great importance in treatment and prevention.

As explaining a difference of wording between the title and substance of the paper it is pointed out that a preliminary note under this title was presented before the Annual Meeting of the American Society of Tropical Medicine in 1937; since when the American Society of Parasitologists has advised the use of the word "infection" in place of "infestation" [a welcome change]. [See also this *Bulletin*, 1941, Vol. 38, p. 524]. *C. L.*

CRAM (Eloise B.), JONES (Myrna F.) & REARDON (Lucy). **The Incidence of Pinworms** (*Enterobius vermicularis*) **in Various Population Groups.**—*Rev. Med. Trop. y Parasit.* Habana. 1941. Jan.–Apr. Vol. 7. No. 1 & 2. pp. 4–6. [11 refs.]

"This paper reviews previous reports on the incidence of pinworms found in various population groups as the result of NIH swab examination. The findings from examination of three additional groups of persons are recorded.

"One group represented a sample of the Latin-American population of Tampa, Florida; a single swab was furnished to each of 438 school children for use at home. While this procedure was admittedly very inadequate for the detection of all cases, examination revealed pinworm eggs on 16 per cent. of the swabs. The other two groups were composed of institutionalized persons, in one case white women in a mental hospital in Georgia and in the other case white boys in an orphanage in Washington, D.C. The results of these examinations, with positive findings in 83 of 165 women and in 14 of 17 boys, furnish additional evidence that *E. vermicularis* may be extremely prevalent under institutional conditions."

BACIGALUPO (Juan). El método del "hisopo" en el diagnóstico de la oxiuriasis. Resultado de los exámenes parasitológicos realizados en los niños del Jardin de Infancia Mitre en el año 1940. [**The Swab Method in the Diagnosis of Enterobius Infection. Results of Examinations for Parasites in Children during 1940.**]—*Semana Méd.* 1941. Aug. 7. Vol. 48. No. 32. pp. 309–313. With 7 charts & 2 figs.

Examination was not by the NIH swab but by a wisp of cotton wool, wrapped round a glass rod, moistened in normal saline, rubbed gently on the perianal skin and then rubbed on a slide with more saline added.

With this was compared the collection of adult worms and of eggs recovered from faeces after an aperient, and of eggs from the nails. The positive percentages in Buenos Aires were—perianal swab 34·28, adult worms in faeces 18·57, eggs in faeces 4·28, eggs under nails 2·85. The total percentage found infected, in the group of 389 children, was 42·1. *C. L.*

WAX (W. V.) & COOPER (N. S.). **Oxyuris Vermicularis Appendicitis. The Incidence of Oxyuris Vermicularis in a Series of 1,016 Cases of Appendicitis.**—*Amer. Jl. Surgery.* 1941. Apr. Vol. 51. No. 4. pp. 89–91. With 2 figs.

Of these 1,016 appendices removed for appendicitis, and all examined microscopically, *Enterobius vermicularis* was found in eight. *C. L.*

JONES (Myrna F.) & JACOBS (Leon). **Studies on Oxyuriasis. XXIII. The Survival of Eggs of *Enterobius vermicularis* under Known Conditions of Temperature and Humidity.**—*Amer. Jl. Hyg.* 1941. May. Vol. 33. No. 3. Sect. D. pp. 88–102. With 5 figs.

These conditions were studied in great detail. It was in general the case that, when eggs were kept in fairly uniform surroundings for from 42 to 48 hours, the percentage of survivals in moist cool air was nearly 70, in dry cool air about 10, in moist warm air less than 10, in dry warm air 0.

"These studies emphasize the great variation in survival under varying conditions and especially the importance of temperature and humidity in connection with the time of survival. The value of relatively dry atmospheres and high temperatures in connection with control measures is indicated." *C. L.*

KUITUNEN-EKBAUM (E.). **Phenothiazine in the Treatment of Enterobiasis.**—*Canadian Public Health Jl.* 1941. June. Vol. 32. No. 6. pp. 308–313. [11 refs.]

"From this preliminary trial the conclusion may be drawn that phenothiazine is of definite value in the treatment of enterobiasis. It is easily administered without laxatives, enemas, or fasting; it is effective in eliminating pinworms and it has apparently no adverse reaction in the patient if administered in moderate doses.

Summary.

"Phenothiazine was administered to 89 children and 9 adults infected with pinworms. The ages of the children were as follows: 24 children from 2 to 5 years of age, 31 children from 6 to 8 years, and 34 from 9 to 14 years of age.

"Adults received from 5 to 10 grm. of phenothiazine and children from 2·5 to 8 grm. Eight adults and 76 children were cured by the first course of treatment. The swabs of one adult and 13 children remained positive after the first course of treatment. Nine of the 13 children were from 2 to 5 years of age and 4 were from 9 to 14 years of age. All responded to the second course of treatment except a 4-year-old child whose swabs were still positive after the second course of treatment; from 2 children no post-treatment swabs were taken."

LANCET. 1942. Jan. 17. p. 86. **Medicine and the Law: A Death after Phenothiazine.**

The patient, a girl of 6, healthy but suspected of threadworm infection, was given 3 half-gramme tablets of phenothiazine on the first day, 4 on each of the next three days, and 2 on the fifth day, a total of 8·5 gm. By this time the child had become pale and slightly yellow, and complained of headache. Later she vomited and on the 11th day was sent into hospital with a temperature of 101°F. The blood count showed 1,250,000 red cells, haemoglobin 26 per cent., normoblasts 1 per cent., reticulocytes 22·6 per cent., platelets 236,000 and leucocytes 16,850.

She was given a drip transfusion of 10 oz. blood, which was followed by a rigor; thereafter she became unconscious and died. In the brain were found multiple small haemorrhages in the region of the corpus callosum; there was no evidence of toxic damage in liver, heart or kidneys, but the appearances of the blood, spleen and marrow were consistent with haemolytic anaemia. There was no indication that blood transfusion had caused death.

[In view of recent reports that phenothiazine can be used with safety it is well that this case should be brought to the notice of medical practitioners. See also this *Bulletin*, 1942, Vol. 39, p. 6, for dosage in children, and for toxic effects in horses.] *C. W.*

LEVIN (Arthur J.). **Recovery of *Trichinella spiralis* Larvae in Early Stages of Infection.**—*Jl. Parasitology.* 1941. Apr. Vol. 27. No. 2. pp. 107–113. With 1 fig. [10 refs.]

Larvae were recovered from the bodies of albino rats 11 to 20 weeks old into whose empty stomachs had been pipetted 30 larvae per gramme of body weight. Larvae of the next generation were obtained from their muscles by grinding these up and placing 25 grammes of the pulp in 60 cc. of 0·9 per cent. saline and shaking it up in a 500 cc. Erlenmeyer flask with glass beads for three or four minutes. After double filtration, saline was again poured into the flask through the cloth and the fluid was again filtered. A known fraction of the total filtrate was examined on a marked slide.

Because larvae do not become encapsuled in muscle till four weeks after infection, they can up till then be recovered from ground-up muscle without the use of pepsin, which is apt to digest them. After infection larvae first appear on day 6, and, since their numbers per gramme do not increase after day 12, it is concluded that only within that period do they enter muscles, though adults are found in the

intestine up to day 16. There are great variations in the number of these second generation larvae after the same numbers of first generation larvae per gramme have been administered to rats. *C. L.*

WYRENS (Rollin G.), TILLISCH (Jan H.) & MAGATH (Thomas B.). **Trichinosis. Report of Nineteen Cases of Clinical Infection and Twenty-One Cases of Asymptomatic Infection.**—*Jl. Amer. Med. Assoc.* 1941. Aug. 9. Vol. 117. No. 6. pp. 428–432. [12 refs.]

Asymptomatic infection with *Trichinella spiralis* and clinical trichinosis are conditions which should be kept separate.

The clinical symptoms observed in these persons were much as usual, but none pointed to cardiac involvement, and in all eosinophilia persisted longer than leucocytosis. Asymptomatic infection was discovered in routine examinations of surgical pathological material at the Mayo Clinic.

"In 12 cases the parasite was found in muscle during routine examination of tonsils, in 2 it was found during examination of thyroid tissue, in 4 it was found during examination of tissue from the lips, in 1 in a mass in the biceps, in 1 in a specimen of lumbar muscle removed at nephrectomy and in 1 in muscle overlying a cyst of the jaw."

In none of these could a history suggesting trichinosis be obtained.

C. L.

DAMMIN (Gustave J.). **Trichinosis. Report of a Case, with Demonstration of the Larva in the Arterial Blood.**—*New England Jl. of Med.* 1941. Feb. 27. Vol. 224. No. 9. pp. 357–360. With 2 figs. [10 refs.]

Sixteen days after eating some uncooked imported smoked ham, a German-born man suffered from fever, malaise and puffy eyelids and had a 15 per cent. eosinophilia. Capillary and venous blood displayed no trichinella larva, but one was found in 5 cc. of blood drawn by puncture from the brachial artery. This procedure is advised for diagnosis.

"During the course of observation, agglutinins to typhoid H (formalin-killed) antigen and typhoid O antigen developed from initial titers of zero to agglutinations in serum dilutions of 1 : 640 and 1 : 1,280, respectively.

"The initial skin reaction to National Institute of Health trichina antigen (1 : 10,000) was of the delayed positive type. This was followed by two negative reactions, the latter of which was performed two months after exposure."

C. L.

MCNAUGHT (J. B.), BEARD (R. R.) & MYERS (J. D.). **The Diagnosis of Trichinosis by Skin and Precipitin Tests.**—*Amer. Jl. Clin. Path.* 1941. Mar. Vol. 11. No. 3. pp. 195–209. With 3 figs. [19 refs.]

The antigen for the cutaneous and precipitin tests is prepared as follows :—

"Adult white rats are infected by doses of about 20 trichinella larvae per gram, either as free larvae by stomach tube or by eating trichinous meat. The strain of *T. spiralis* was isolated from a human diaphragm and is kept alive in the rat colony. After about 5 weeks the infected rats

are sacrificed, skinned, eviscerated, and ground in a meat chopper. The meat is digested and the larvae liberated in 6 to 12 hours by agitation in an aqueous solution of 1 per cent. pepsin and 0·7 per cent. HCl in a 37·5°C. incubator, using about a liter of solution to each 100 grams of meat.

"The digest is passed through a sixty-mesh sieve to remove undigested soft tissues and bone and placed in large (2 liter) glass funnels fitted with rubber tubes and pinch cocks. The larvae settle rapidly, are drawn off into round glass jars of 200 cc. capacity which are then covered by 4 layers of wet cheesecloth held in place by rubber bands and inverted into conical sedimentation glasses filled with tap water. These are placed in the incubator for a few hours until the motile larvae have passed through the cloth and settled to the bottom leaving practically all the debris behind. The jars and supernatant fluid are removed and the larvae from all of the glasses are transferred to a 50 ml. conical centrifuge tube and washed in tap water until the fluid is clear. Following centrifugalization a small amount of fine debris is sometimes found overlying the larvae; this is readily removed with a capillary pipette. Three or four washings are usually sufficient to leave a clear supernatant fluid giving a negative biuret test.

"After removing the excess water, the tube of larvae is rotated in a salt-ice or carbon dioxide snow bath until the mass is frozen solid over the inside of the tube. The tube of frozen larvae is placed in a vacuum desiccator containing calcium chloride and dry NaOH, the air evacuated with a high vacuum pump for a half hour, and then sealed. When these procedures are carried out properly the larvae remain frozen until dehydration is complete. After about 18 hours in the desiccator the thoroughly dried flaky mass is removed and placed in glass vials in weighed amounts, sealed by flame and kept for future use. It was found important that the drying of the larvae be hastened as much as possible because slow drying allows the growth of bacteria causing loss of specificity in the finished antigen. The freezing technic eliminates this difficulty.

"Early in our investigations dried larvae were extracted with ether for 12 to 24 hours, the ether decanted and the residue dried and weighed before extraction. This step was eliminated after observing no differences in the tests made with ether-extracted and non-ether-extracted antigens.

"Extraction is carried out by mixing buffered saline solution (0·5 per cent. NaCl, 0·143 per cent. Na_2HPO_4, 0·036 per cent. KH_2PO_4, and 0·4 per cent. phenol at pH 7·1) and a weighed amount of dried larvae to a concentration of 1 : 100. After 12–18 hours in the refrigerator the suspension is placed in a ball mill (a 250 cc. centrifuge flask half full of 5 mm. steel balls) and slowly revolved over night in a horizontal position. . .

"The turbid solution from the ball mill is now cleared by centrifuging for 1 to 2 hours at the highest available speed. Maximal trituration in the ball mill, long high speed centrifugalization and the phenol of the extracting and diluting fluid produce a sterile antigen as checked by bacteriological methods. . . . After testing for sterility the antigen in 1 : 100 dilution for precipitin tests and 1 : 10,000 dilution for skin tests is placed in sterile 2 ml. vaccine vials with rubber stoppers having thin diaphragms readily punctured by an hypodermic needle. Similar vials of sterile buffered saline solution are prepared for controls. Antigen kept in a refrigerator has shown no noticeable deterioration for at least a year."

For the intradermal test the forearm is cleansed with alcohol and dried; 0·1 ml. of 1 : 10,000 dilution of antigen is injected, a control solution of buffered saline being injected in another spot with another syringe. A blanched area appears at each site; the control disappears, the test area in a positive case forms an itching weal, reaching a maximum in 20 minutes; the weal is, in a definite case, 7 mm. or more in diameter with an erythematous zone to 20 mm. This is the *immediate type* of reaction, and may have disappeared entirely in 24

hours. Some persons (see below) show a *delayed type* of reaction reaching a maximum in 24 hours as a slightly swollen, tender, red area 1–3 cm. in diameter.

Of 36 persons ill with the classical symptoms of trichinosis 35 gave the *immediate* type of response (the other patient was moribund). The *delayed* type occurs in the early stage of infection and in long-standing quiescent cases.

For the precipitin test 0·2 ml. of a 1 : 100 dilution of antigen is layered over by the same amount of clear uninactivated serum in a 7 mm. wide thin-walled serological tube ; a control with saline is also set up. After an hour in a water-bath at 37·5°C. an opaque whitish disk appears at the junction of the fluids in positive cases. It may appear in a few minutes at room temperature. Chylous or haemolysed sera are not suitable for testing.

Both the intracutaneous and the precipitin tests may be used with success years after the initial infection. *H. H. S.*

MAUSS (Evelyn Abrams). **Occurrence of Forssman Heterogenetic Antigen in the Nematode,** *Trichinella spiralis.—Jl. Immunology.* 1941. Sept. Vol. 42. No. 1. pp. 71–77.

BEESON (Paul B.). **Trichiniasis. Clinical Manifestations and Diagnosis.** *Lancet.* 1941. July 19. pp. 67–69. [20 refs.]

The Physician to the American Red Cross Harvard Field Hospital Unit, Salisbury, surveys the subject and points out that accurate diagnosis will be more frequent when medical men realize the many possible variations of the disease ; and to stress this point he cites a family in which seven cases occurred and were diagnosed as : influenza, mumps, encephalitis, typhoid fever and acute alcoholism.

The infection, transmitted by pork or by pork sausages, is rarely recognized clinically. In one American outbreak from one meal the incubation periods lay between 3 and 20 days. The symptoms are fever nearly always, oedema of orbit and of the lower part of face, of conjunctiva (chemosis), of scrotum, over sacrum and over painful and tender muscles ; subungual linear haemorrhages are almost pathognomonic ; skin eruptions morbilliform, urticarial or nodular ; hypotension is common and in one case was as low as 44/18 mm. Hg. ; electrocardiographic changes showing as flattening and inversion of the T wave in lead 2, low amplitude of the QRS complex, and evidence of intraventricular block, there being interstitial myocarditis with larvae in the muscle, though they do not get encysted there ; lesions of the central nervous system may dominate the picture, suggesting meningitis or encephalitis ; gastro-intestinal symptoms occur in less than half those with clinical infection ; absence of blood and mucus from the stool is useful in pointing away from dysentery ; cough and pain in the chest are frequent ; enlargement of the spleen is fairly common, of lymph nodes rare. In recent epidemics the death rate has been less than 5 per cent., and for survivors complete recovery is the rule.

In diagnosis, search for the adult in the faeces is usually a waste of time ; search of the blood for larvae should be done oftener than it is, by laking 5 cc. of blood in 50 cc. of water, centrifuging, and examining the sediment under a low power ; after the third week muscle biopsy should be undertaken, by removing about 1 gramme, making a squash

preparation of about a half and sectioning the rest ; eosinophilia in the second and third weeks usually lies between 15 and 40 per cent., and lasts for three months but may persist for 12. Immune reactions have been found in 10 per cent. of routine examinations made in the U.S.A., but such a reaction appearing where there had previously been none is of real value in diagnosis. The delayed skin reaction is usually present for a few days only about the end of the second week, the delay amounting to 12 or 24 hours ; the immediate reaction comes on within 10 minutes of making the test, appearing from the third or fourth week and possibly obtainable for months or years. Precipitin tests begin to be positive at the time skin tests do, and are useful if the latter are equivocal. Sometimes there is a positive Widal reaction during the acute stage ; X-rays can seldom or never display calcification of cysts, these being too small, but cysticercus cysts have probably been mistaken for them. *C. L.*

DELLA VIDA (B. L.) & DYKE (S. C.). **Blood-Picture in Trichiniasis.** —*Lancet.* 1941. July 19. pp. 69–71. With 1 chart.

" The blood-picture has been followed in about 100 patients suffering from infestation with *Trichinella spiralis*. The following points were observed.

" Leucocytosis occurs in a primary wave reaching its peak at about the third week from onset of symptoms and a secondary wave reaching its peak at the eleventh week.

" The eosinophils diminish or may disappear within the first three days from onset of symptoms ; thereafter they increase in primary and secondary waves coinciding with those of the general leucocytosis.

" The neutrophils diminish during the waves of general leucocytosis and increase as the eosinophilia diminishes.

" The monocytes increase with the first diminution in the eosinophilia.

" In addition to true eosinophil cells, neutrophils bearing within their cytoplasm greater or lesser numbers of eosinophilic (acidophilic) granules may appear, especially in the early stages of infestation." *C. L.*

MISCELLANEOUS.

SCHAEFFER (C. O.). Onderzoek over de herkomst van typhusbacteriën, voorkomend in het rioleerings-systeem van Bandoeng. [**Typhoid Bacilli in the Sewage System of Bandoeng.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. July 22. Vol. 81. No. 29. pp. 1535–1547. With 1 fig.

It had been maintained that the presence of typhoid organisms in the sewage systems of Batavia and Bandoeng was due to their multiplication in slime deposit or to their derivation from animals living in the sewers such as rats, cockroaches, &c., and not simply to their presence in human faeces. Proof to the contrary is forthcoming by showing that the number of the typhoid bacteria found in the sewage is exactly correlated with the content in human excreta. Samples of sewage were taken from different places in the system and also from the same

place at different times. The conclusion is drawn that "the typhoid bacteria which are found in the sewage must be of human origin and are deposited there with faeces and urine." *W. F. Harvey.*

VERHAART (W. J. C.). **Cerebral Disorders in Infants and Children at Batavia. A Record of 1,405 Cases.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. July 8. Vol. 81. No. 27. pp. 1430–1484. [66 refs.]

This is an important paper from the point of view of clinical medicine in that it indicates those diseases which should be expected in children who show signs of cerebral disorder, and from the epidemiological point of view in that many of the conditions are of public health importance. It is a record of cases seen in the neurological department of the School of Medicine, Batavia, in the 9 years 1932 to 1940 inclusive. The 1,405 cases include 2 main groups: the meningitides (368) and the encephalopathies (1,037). In the first group 180, or about one half, were due to tuberculous meningitis, and it is pointed out that the clinical picture in this disease is very variable; in diagnosis the tuberculin test and X-ray of the lungs may be necessary in addition to lumbar puncture. Pneumococcal meningitis was more common than the meningococcal form.

Of the 1,037 encephalopathies the main group consisted of 318 cases in which the cause could not be determined. The next largest group comprised 180 cases of bacillary dysentery with cerebral intoxication, in which the commonest sign was convulsions and in which 143 cases were fatal. Encephalopathy consequent upon pneumonia accounted for 152 cases and 116 deaths; that accompanying enteritis and dyspepsia for 82 (66 deaths) and 86 (76 deaths) respectively. Lead encephalopathy was seen 53 times (39 deaths), all the cases except one being in Chinese infants under two years of age. Diagnosis in this condition depends on the chemical analysis of urine and cerebrospinal fluid, and on X-ray examination of long bones, together with knowledge of the possible source of the lead. Birth injuries and congenital malformations account for 38 cases, typhoid fever for 17 and sepsis for 23. Subtertian malaria was responsible for only 13 cases, poliomyelitis for 11, the infectious fevers for 26. There is a group of 6 in which the encephalopathy is attributed to dietary deficiency, one of 9 in which icterus neonatorum is implicated; the remaining few cases are attributed to syphilis and to certain rare conditions.

Descriptions of the clinical course and, in some instances, of the pathological findings, are given in a number of cases, and treatment is briefly touched upon, especially as regards relief of raised intracranial pressure and the prevention of convulsions. The paper is too long for more than brief abstract, but should be consulted in the original (fortunately written in English) by those desiring fuller information.

C. W.

LOE PING KIAN. Een geval van lood-encephalopathie bij een Chineesche zuigeling. [**Lead Encephalopathy in a Chinese Infant.**] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1941. Aug. 5. Vol. 81. No. 31. pp. 1667–1673. With 1 plate. English summary (8 lines). [Summary appears also in *Bulletin of Hygiene.*]

The case is reported of a child, 7 months old, suffering from plumbism. The poison had been ingested owing to the habit of the mother of

using a preparation known locally as *yok-san-merah* as an application to the buccal and lingual mucosa to prevent aphthae. This is a red powder and contains both lead and mercury, one of the constituents being *tjoeseh* which is mercuric sulphide (cinnabar). It is a matter for wonder that cases of poisoning are not more numerous, as the preparation is a popular household remedy among the Chinese in Java. [VERHAART (above) has recently reported 53 cases of lead encephalopathy, 39 of them fatal, seen among infants attending the Neurological Department of the School of Medicine, Batavia, in the nine-year period 1932–40. The condition would, therefore, appear to be far from uncommon there.] *H. H. S.*

RAO (B. Tirumal) & MENON (T. Bhaskara). **A Study of Rhinoscleroma in Vizagapatam.**—*Indian Med. Gaz.* 1941. June. Vol. 76. No. 6. pp. 321–323. With 8 figs. on 2 plates. [12 refs.]

Six cases of this condition are reported by the authors with brief details of each ; four were males between the ages of 24 and 40 years, and two were females of 45 and 50 years ; all were Hindus. In four the characteristic histological changes were seen and the organism *Klebsiella rhinoscleromatis* present. In one case culture was tried with success. The condition is shown by four good photographs of three of the patients and an equal number of photomicrographs demonstrate the organism and changes in its morphology, together with the histological appearances. Treatment is not very satisfactory, though radium bromide or roentgen rays may benefit. The general health was little, if at all, affected. *H. H. S.*

FISHER (A. C.). **Acute Thrombophlebitis of Unknown Aetiology.**—*South African Med. Jl.* 1941. Apr. 12. Vol. 15. No. 7. pp. 131–139. With 4 figs.

The author reports 21 cases of this condition in the copper mining area of N. Rhodesia, where it is becoming increasingly frequent. The cases had so much in common that they suggest a common underlying cause which, however, is still unknown. There were 19 natives and two Europeans in the group. After a few hours of malaise the temperature rises, and within 24 hours there is severe pain over one of the larger veins, with tenderness and muscle spasm. Oedema appears distal to this area and from about the fourth day the thrombosed vein may be palpable. The temperature usually falls by lysis about this time, the oedema gradually disappears, and the vein becomes soft and impalpable. If a second vein becomes involved, recrudescence of the pyrexia is observed.

The leucocyte count is typical of an acute infection, and the sedimentation rate is increased ; the Kahn test was negative in the cases observed. Embolism and suppuration were not observed, and the complications were only those which might result from clotting of veins in special areas, such as the splanchnic. Differential diagnosis must be made from tropical myositis. Death occurred in three cases, in which there was either splanchnic or cavernous sinus thrombosis. The treatment given was conservative and palliative. Details of the cases are given.

The veins affected were widely different : cavernous sinus, jugular, subclavian, axillary, basilic, femoral, popliteal, saphenous and veins

of the portal system. This suggests a circulating toxin, but it is not known what determines the vein attacked, or why multiple thromboses are not more common.

The author suggests that this disease may be a cause of the "thick leg" which is so often seen in natives. *C. W.*

DE WAAL (H. L.). **Senecio Alkaloids—Part III. Chemical Investigations upon the Senecio Species Responsible for "Bread-Poisoning." The Isolation of Senecionine from** *Senecio ilicifolius* **Thunb. and a New Alkaloid "Rosmarinine" from** *Senecio rosmarinifolius* **Linn.**—*Onderstepoort Jl. Vet. Sci. & Animal Industry.* 1940. July & Oct. Vol. 15. Nos. 1 & 2. pp. 241–249. With 2 figs. [10 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Senecio (ragwort) has been recognized as poisonous to stock for nearly a quarter of a century, and human beings have been poisoned by bread made with wheat contaminated by the presence of species of Senecio, notably *S. ilicifolius* and *S. rosmarinifolius*. The former contains senecionine, an alkaloid with the formula $C_{18}H_{25}O_5N$ previously isolated from other species of Senecio, *viz. S. vulgaris, S. viscosus, S. squalidus* and *S. aureus*. The latter (*S. rosmarinifolius*) has been found by the author to contain an alkaloid differing from senecionine, and having the formula $C_{18}H_{27}O_6N$; to this he gives the name *rosmarinine*. He describes its chemical properties and urges eradication of these plants which are abundant in South Africa. [See *Bull. of Hyg.*, 1936, Vol. 11, p. 849; 1937, Vol. 12, p. 898, for the symptoms produced.] *H. H. S.*

DE WAAL (H. L.) & TIEDT (J.). **The Senecio Alkaloids—Part IV. Platyphylline, the Active Principle of** *Senecio adnatus*, **D. C.**—*Onderstepoort Jl. Vet. Sci. & Animal Industry.* 1940. July & Oct. Vol. 15. Nos. 1 & 2. pp. 251–259. With 3 figs. [Summary appears also in *Bulletin of Hygiene.*]

Another species of Senecio, *S. adnatus*, also poisonous to stock, has been investigated by the authors, and they have isolated another alkaloid, *platyphylline*, from it, with the composition $C_{18}H_{27}O_5N$. This is also present in *S. platyphyllus* (hence the name). *S. adnatus* contains as much as 0·5 per cent. of the alkaloid in the dried plant. It can be split up into platynecine, $C_8H_{15}O_2N$, and platynecic acid, $C_{10}H_{14}O_4$, a monobasic acid perhaps identical with senecic acid. *H. H. S.*

DHARMENDRA. **The Arneth Count in the Tropics.**—*Indian Med. Gaz.* 1941. July. Vol. 76. No. 7. pp. 399–404. [27 refs.]

The blood of 50 healthy Indians, doctors and assistants at the Calcutta School of Tropical Medicine, was examined, and the average weighted mean of the Arneth count, using Cooke's criterion, was 2·014 with standard deviation of 0·132. This figure is significantly lower than that given as the normal standard in Britain, but it is similar to the standards found in Iraq, Egypt and China. The author discusses the suggestions which have been made to explain the tropical shift to the left and suggests that the accelerated removal of neutrophils from the circulation is the primary cause for the left-handed shift. DANZER has shown that the breakdown of blood cells produces bone marrow stimulus. The author suggests that the next step is to find what factor in tropical climates shortens the life of the neutrophil.

W. P. Kennedy.

DAS GUPTA (C. R.). **The Arneth Count in Normal Indians.**—*Indian Med. Gaz.* 1941. July. Vol. 76. No. 7. pp. 404–406.

The Arneth count, using Cooke's criterion, was done in 50 doctors and assistants of the Calcutta School of Tropical Medicine. The average weighted mean was 1·84. The author suggests that the slightly higher result obtained by DHARMENDRA is due to the fact that he used haematoxylin and eosin, while Das Gupta used May-Grünwald and Giemsa, which allowed for clearer differentiation of the eosinophils.

W. P. Kennedy.

WU (C. H.) & TSAI (C.). **Hematological Standards for the Chinese.**—*Chinese Jl. Physiol.* 1940. Vol. 15. No. 3. pp. 289–299. [Summarized in *Experiment Station Rec.* 1941. Sept. Vol. 85. No. 3. p. 414.]

"Cell volume, hemoglobin value, red blood cell and white blood cell counts, and erythrocytic fragility were determined in 310 healthy adult Chinese by methods noted briefly. These and several blood coefficients are reported and compared with standards established for westerners. For male subjects red blood cells averaged 5,000,000 per cubic millimeter, cell volume 42 per cent., hemoglobin content 98 per cent. of the Haldane hemoglobinometer scale equivalent to 13·6 gm. per 100 cc. of blood; for female subjects the corresponding averages were 4,200,000, 35·7 per cent., and 82 per cent. (equivalent to 11·3 gm. per 100 cc.), respectively. Mean corpuscular volume averaged 85·4μ^3, mean corpuscular hemoglobin 27·4$\gamma\gamma$, and mean corpuscular hemoglobin concentration 32 per cent. The degree of erythrocytic fragility varied appreciably with different individuals. With concentrations of buffered NaCl solution of 0·38, 0·40, 0·41 and 0·42 per cent. at *p*H 7·15, the mean percentages of hemolysis were 70–74, 46–55, 37–39, and 24–32, respectively. White blood cell count also showed quite large variations, the average (shown to be valid statistically) being about 6,800 per cubic millimeter for both sexes."

DAVIDSON (W. B.). **The Rocky Mountain Wood Tick and Tick Borne Diseases.**—*Canadian Jl. Comp. Med.* 1941. May. Vol. 5. No. 5. pp. 123–133, 136–137. With 7 figs. & 1 diagram. [31 refs.]

This is a good general consideration of the part played by *Dermacentor andersoni* in human and animal disease in North America, with a description of the anatomy of the tick and a description of control measures, which include the dipping of stock and an interruption of the life cycle by destroying the gophers, rabbits and other small animals necessary as hosts for the young ticks. As far as Rocky Mountain fever is concerned, infection acquired by the larvae or nymphs is passed on to the adult stage, and may be passed from females through their eggs to the next generation; male ticks may infect females during impregnation. In a fasting tick the virus may be inactive, to be reactivated on the ingestion of blood. Vaccine is prepared by grinding infected ticks which have been sterilized externally after having been bred under laboratory conditions.

D. andersoni transmits tularaemia by bite or through its excreta. A description of other methods of transmission and of the clinical

features of the disease is given and a reference is made to tularaemia in sheep. Q fever is another human disease transmitted by *D. andersoni*. There is a description, not new to readers of this *Bulletin*, of tick paralysis in man, also caused by *D. andersoni*, and to the same condition in animals. *C. W.*

MACGREGOR (R. G. Scott) & LOH (G. L.). **The Influence of a Tropical Environment upon the Basal Metabolism, Pulse Rate and Blood Pressure in Europeans.**—*Jl. Physiology.* 1941. June 30. Vol. 99. No. 4. pp. 496–509. [29 refs.]

The evidence which has been accumulated on this subject indicates that a depression in the basal metabolic rate is a common reaction in those going to a tropical climate from temperate zones. Concerning changes in the pulse rate, observations made by earlier workers have led to the general impression that the rate increases at first but decreases with residence, and that acclimatization is a factor which has been held to be responsible for this. The systolic and diastolic blood pressures are generally regarded as being lower in tropical circumstances than in temperate, although it is not wise to accept as definite evidence averages found by different observers where the method of measurement is not standardized to a greater degree.

The present paper records observations of both basal metabolic rate and blood pressure carried out upon Europeans resident for varying periods in Singapore. The subjects were soldiers living in barracks and were divisible into two groups. One group consisted of 35 subjects whose residence in the tropics had not exceeded six months, and the other of 35 who had been in the tropics for 2½ years. The groups were closely comparable with each other in respect of diet, exercise and occupation, and similar in physical data. All the subjects were in a good state of health and there was no evidence to indicate that the group which had been resident in the tropics for 2½ years was in any way less fit than the group which had been less than six months in Singapore. It should be pointed out, however, that the group with longer residence in the tropics had been under army training for over 2 years, while a certain percentage in the other group had only recently joined the unit from civilian life.

The experimental procedure was as follows. All subjects were conveyed to the laboratory by car after a night's rest and without food. They then spent a preliminary period resting on camp beds and strict supervision was kept to ensure complete rest and quiet. Two basal metabolism measurements were made upon each subject on four separate days. The pulse rate and blood pressure were also measured, with the subject in the basal and post-absorptive state. Of the two daily metabolism measurements, one was made between the first half-hour and hour, and the other during the second hour. A third measurement was made if either was unsatisfactory. Blood pressures were measured by the auscultatory method and the basal metabolic rate was determined with a Benedict recording spirometer. A half-face mask was used in preference to mouthpiece and noseclip, in view of its greater comfort. Some forty control experiments were performed, using the Douglas-Haldane technique in addition to the spirometer. The results showed good agreement between the two methods.

Basal metabolism showed a definite reaction to tropical environment in certain individuals which was absent in others. The reaction consisted of a gradual fall in the B.M.R. and a corresponding variation in pulse rate and systolic and diastolic blood pressures. The depression in metabolism in those subjects affected appeared to reach a maximum before the end of the first year in the tropics. This lower value is shown to be maintained after 2 years in the tropics and was not affected by a period of military training in the subjects examined. The environmental factors which may influence these values are discussed and it is concluded that climatic rather than dietetic or occupational influences are primarily responsible for the variations noted.

C. G. Warner.

BLACKLOCK (M. G.). **Diseases of Women in the Tropics.**—*Practitioner.* 1941. June. Vol. 146. No. 6. pp. 372–379.

The subject of this article is discussed under the headings of diseases associated directly or indirectly with climatic conditions and those attributable to social or economic defects. Native-born women suffer little from diseases due to hot climates and newcomers need not if they adopt suitable living conditions, especially as regards exercise and congenial occupation.

Malaria heads the list of diseases indirectly due to climate, especially in its effect on maternal mortality and still-births, though fortunately the placenta is usually an effective barrier to infection of the foetus. Hookworm and dysentery are widespread. The importance of anaemia in the aetiology of puerperal sepsis has been brought out in a recent survey in Calcutta (1940) in which it was found that " 49 per cent. of the women who died of sepsis after spontaneous delivery at home suffered from anaemia."

Lack of skilled antenatal and obstetric care gives rise to much ill health and dietetic deficiencies lead to osteomalacia and beriberi.

The health of European women in the tropics has improved greatly in the last two decades as a result of public health measures and a better knowledge of personal hygiene. In a table of vital statistics of European officials in West Africa in 1934–38, while the male death rate varied between 5·2 and 9·3 per 1,000, the rate for women was nil. The invaliding rate amongst women was, however, appreciably higher than amongst men.

Needs for the future are the extension of maternity and child welfare work and much more attention to nutrition. In the latter connexion attention is drawn to the report of the Committee on Nutrition in the Colonial Empire (1939) : Reports I & II (Cmd. 6050, 6051).

W. H. Peacock.

SNEATH (P. A. T.). **A Study of the Crude Birth/Death Ratio (Vital Index) in British Guiana.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941. Sept. 9. Vol. 35. No. 2. pp. 105–117. With 5 figs.

The author observes that a newcomer to the Colony is faced with such questions as (*a*) what is the major public health problem ? (*b*) what group does it most affect ? (*c*) where is the problem most serious ? and with a view to discovering answers wholly or in part to some of these questions, he undertook a detailed survey of the vital statistics over an extended period of time, adopting for purposes of

convenience in this study Pearl's "*Vital Index*" method of assessment, *i.e.*, the ratio 100 Births/Deaths. [According to Pearl, when the ratio exceeds 100 it indicates a growing and biologically sound population.*] Dr. Sneath is careful to point out that though the Vital Index must necessarily reflect the effects of a variety of known and obscure factors, acting alone or in various combinations, it was nevertheless a useful and convenient technical expedient for the assessment of the relative importance and location of epidemiological problems under conditions obtaining in British Guiana.

From 1919 onwards the vital index figure showed gradual improvement, with the malaria and infant mortality rate curves in close correlation. But since malaria is seldom recorded in the Colony as a cause of death in infancy, it was necessary to test this aspect of the problem; yet, when the necessary corrections were introduced the trend of the vital index curve was not altered. It seemed evident therefore that malaria and the undefined fevers were the major factors affecting the fluctuations of the index figure and that the improvement indicated by the annual vital index must be associated with either an absolute reduction in the incidence of malaria or the effects of premunition developing in a population that is not now subject to immigration. [It may be noted that the introduction of indentured immigrants ceased in 1920, since when repatriation has resulted in an insignificant depletion of the Colony's population.]

After calling attention to the fact that the significance of endemic malaria as a dominant factor in the crude vital indices was established in 1938 by the extended studies of GIGLIOLI on selected sugar estates in the Colony [see this *Bulletin*, 1939, Vol. 36, p. 940], Dr. Sneath next sought to discover which areas might appear to offer the best opportunities for the investigation of the epidemic factors and endemic problems by detailed examination of the crude vital index figures for each county, in order that local variation might be determined. Thereafter, racial variations were studied, in an effort to show to what extent the imported races have been able to accommodate themselves to prevailing conditions in the Colony. In this connexion Dr. Sneath records the interesting finding that the Chinese appear to have accommodated themselves to local conditions to a more satisfactory extent than any other distinctive racial group, yet the group designated "*Mixed Races*" presents the most striking feature in this particular branch of the study, for the figures appear to substantiate the well-known observation as to the hardihood of hybrids and suggest the probability that, in time, this group may predominate in British Guiana.

In this interesting and valuable contribution, Dr. Sneath has succeeded in demonstrating from his studies and use of the vital index that malaria is a dominant factor, that the disease occurs in periodic epidemics, that there appears to be a possibility of a development in the population of premunition to the prevailing strains of malaria, and that the vital index figures for locality and race afford a convenient means of ascertaining the effect of the Colony's major health problem with regard to these specific factors. *P. Granville Edge.*

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* See *The Vitality of the Peoples of America.* Raymond Pearl. *Amer. Jl. Hygiene.* Vol. I. 1921. pp. 592–674. *Medical Biometry and Statistics.* Raymond Pearl. 3rd Edn. 1940. pp. 207–217.

REVIEWS AND NOTICES.

COVELL (Gordon) [C.I.E., M.D.(Lond.), D.P.H., D.T.M. & H.(Eng.), Lt.-Colonel, I.M.S., Director, Malaria Institute of India]. **Malaria Control by Anti-Mosquito Measures.** Second Edition. Revised, enlarged and brought up to date by the Author.—pp. xi+224. With 13 text figs. & 2 plates. 1941. Calcutta: Thacker, Spink & Co. (1933), Ltd. London: W. Thacker & Co., 34–40 Ludgate Hill. [12*s*.]

A review of the first edition of this useful book appeared in this *Bulletin*, 1931, Vol. 28, p. 1035. During the 10 years that have elapsed the volume of literature that has been published on the subject of malaria control has been prodigious. The bibliography, which was a praiseworthy feature of the first edition, contained 570 references. The bibliography of the second edition, now published, occupies 95 pages, nearly half the contents of the book, and contains 1,148 references.

The first three parts of the book, dealing with protection against bites of mosquitoes, measures against adult mosquitoes, and measures against larvae of mosquitoes, remain substantially unchanged. In the second edition a fourth part treats of the more important advances in malaria control that have been made during the past ten years; this consists of 27 pages.

The book is intended primarily for the practical worker in India. In an appendix is given a list of firms in India who can supply various articles of anti-mosquito equipment.

The amount of information that is packed into so small a space is remarkable. Few, if any, of the methods of malaria control that have been advocated can have escaped mention. Some of these methods are of limited value. If the author had omitted all reference to these and dealt at greater length with those measures of control which his vast practical experience has shown to be most effective, the practical value of the book to the field worker might have been enhanced. As it is, however, the field worker, wherever he may be, can hardly fail to find in the pages of this small book valuable suggestions as to how the malaria problems with which he is faced might best be solved. The very complete bibliography will certainly be useful to malariologists.

Norman White.

ELLERMAN (J. R.). **The Families and Genera of Living Rodents. With a List of Named Forms (1758–1936)** by R. W. HAYMAN & G. W. C. HOLT. **Volume I. Rodents other than Muridae.**—pp. xxvi+689. With 189 text figs. **Volume II. Family Muridae.** pp. xii+690. With 50 text figs. 1940. 8th June & 1941. 21st March. London: Printed by Order of the Trustees of the British Museum. [£1 15*s*. each Volume.]

The book is precisely described by its title. It is a strictly taxonomic work which defines the families and genera, an enormous task, for 343 genera are recognized (the Duplicidentia, *i.e.* hares, rabbits, etc., being excluded from the scope of the book). Species and subspecies are not defined or discussed, but they are listed under each genus with a reference to the original description and a statement of the type locality. The author also discusses the general lines on which previous

workers have classified the Rodentia and gives an account of their distribution by zoogeographical regions. The volumes contain nearly 250 excellent line drawings of skulls and teeth, and it is understood that a third volume is in preparation to be devoted almost entirely to figures.

To the readers of this *Bulletin* the book will be a valuable referee on systematic questions and will help to standardize the nomenclature of the rodents. Many workers have to know and identify a large number of species of wild rodents which are involved in the spread of sylvatic plague in Africa and other areas, or which act as hosts of Ornithodorus and perhaps as reservoirs of the spirochaetes of relapsing fevers. *P. A. Buxton.*

REVISTA DE COMBATE À LEPRA. Rio de Janeiro. [**Review of the Campaign against Leprosy (in Rio de Janeiro).**] 1941. Mar. Vol. 6. 305 pp. With 1 chart, 1 map & 1 plate.

This book is useful as a work of reference. It is the official record of the Federation of Societies to Aid Lepers and to fight against the disease. The chief part of the publication is taken up by brief accounts of the many preventoria or institutions for dealing with lepers in the various States and Departments of Brazil. This and the other, smaller, contributions are mostly, if not entirely, of local interest. They include a short account of the disease in Santa Catarina, a census of lepers in a certain district of Minas Geraes, designated Zone N, a brief note on leprosy and marriage consisting of quotations from the work of previous writers, and, lastly, the plants which have been introduced and cultivated for the treatment of the disease. Those who wish to know what facilities and institutions there are in the country for dealing with lepers will here find all the information readily put together. *H. H. S.*

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